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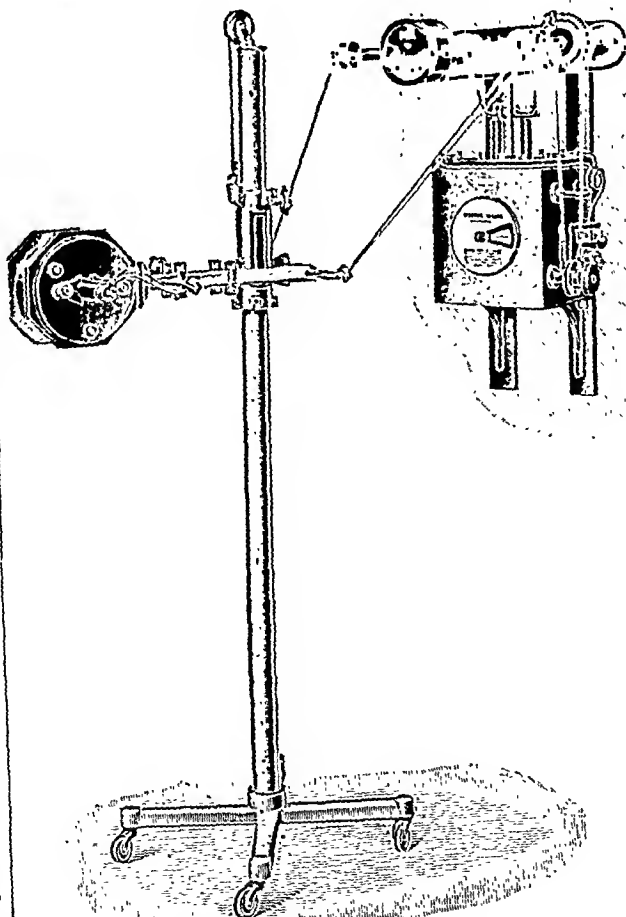
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Original Articles.

WEIL'S DISEASE, AS OCCURRING IN THE ANDAMANS.*

By V. N. DEUSKAR, L.C.P.S., I.M.D.,

Haddo, Port Blair.

THE subject for to-day is Weil's disease, otherwise called infectious jaundice or spirochætosis icterohæmorrhagica—a fever with jaundice which has confused us in the Andamans for about the last 33 years and which has been from time to time described under various different names.

From the elaborate thesis of Lt.-Col. Barker, O.B.E., I.M.S., our former Senior Medical Officer, on "Leptospirosis" that appeared in the *Indian Medical Gazette* for October 1926, it will be seen that the existence of Weil's disease in the Andamans is now almost, *though not finally*, proved, and for this we all owe a debt of gratitude to him. Before proceeding with the subject proper I take it for granted that everyone of you present here to-day has gone through that thesis, and I would like to make it clear that in the present paper my only aim is to put before you a few facts with regard to the disease, as studied in a series of 23 cases treated in the wards of Haddo Hospital during 1926.

History.

Epidemics of jaundice have been reported to have occurred from very early times. Landouzy reported the occurrence of this disease in 1882 and Mathieu in 1886, Weil after whom the disease has been named without, it is said, enough justification reporting subsequently four cases. Valuable work however was done in 1914 by Inada and his colleagues who distinguished this disease from other forms of jaundice and put the etiology on firm basis by discovering the spirochæte concerned as the causative organism, and it was finally distinguished from yellow fever in 1918 by Noguchi's discovery of *Leptospira icteroides*, a similar spirochæte which he proved to be the causative organism of yellow fever.

Although Weil's disease is likely to be confused with various forms of fever with jaundice, that with which it is most likely to be confused is yellow fever; so much so that it may be impossible to distinguish one from the other on clinical grounds alone, since nearly all the symptoms that can occur in Weil's disease can also occur in yellow fever. Moreover, *L. icterohæmorrhagica* of infectious jaundice is not easy to find, and when found it is not easy to identify the spiro-

chætes for they are morphologically very closely similar to *Leptospira icteroides* of yellow fever. It is for these reasons that it becomes all the more necessary for us to substantiate our views in favour of the existence of Weil's disease in these islands by grounds other than such identification, and especially so because serological and immunological differentiation has so far not been attempted.

Considering the epidemiology of yellow fever, we find that for this disease to continue endemically in a place three conditions are required to be fulfilled, viz., there must be present

1. The causative organism: i.e., the *Leptospira icteroides*.
2. The vector: i.e., the mosquito concerned, *Aedes argenteus*, formerly known as *Stegomyia fasciata*. This species we know for certain exists in the Andamans.
3. The susceptible human beings.

Now when this is remembered and the mosquito population of the Andamans is taken into account, does it seem possible for yellow fever to continue endemically without any epidemic extensions?

Our experience of the disease prevalent here is that:—

- (a) Cases have occurred more or less sporadically;
- (b) The disease has not affected the new arrivals in any particular manner;
- (c) The white population has remained practically free; although a case here and there has been recorded;
- (d) It has never raged in any epidemic form; and
- (e) Our principal seaports of communication, viz., Calcutta, Madras and Rangoon, have not yet been invaded.

All these points are against yellow fever and the epidemiological importance of these cannot be ignored.

Coming to clinical considerations, we find that as yet no cases have been recorded which typically resemble yellow fever. The character of the disease here has been frequently described from as long ago as 1903, but so far none of the descriptions have pointed to the occurrence of the three stages of yellow fever or the characteristic "black vomit" of that disease. Are we then to believe that the cases that occurred over so many years last were all "atypical" cases of yellow fever? Such an assumption would be too far-fetched and can have no justification. As regards the black vomit, I may say that even in the fatal cases of yellow fever it may sometimes be absent during life, but its presence as a post-mortem finding is said to be almost invariable. But you will see that even in the most carefully conducted post-mortem examinations here in not a single case has its presence yet been recorded.

With all this negative evidence available, I think we can fairly exclude the possibility of yellow fever in the Andaman Islands.

* Being a paper read before the Clinical Society, Port Blair on 2nd March 1927, and published by the kind permission of Major J. M. R. Hennessy, I.M.S., Senior Medical Officer, Port Blair.

Definition.

As regards the definition of Weil's disease, Noguchi's seems to be the best. He describes it as "an acute, non-contagious disease caused by the invasion of a special organism *Leptospira icterohæmorrhagiæ* discovered by Inada and Ido in 1914. It is characterized by fever, jaundice, hæmorrhages and nephritis, and one attack usually confers complete and lasting immunity. The avenue of entrance of the organism is not known and animal experiments have shown that it is capable of penetrating the intact skin and mucous membrane of the alimentary tract."

Ætiology.—To be brief, *L. icterohæmorrhagiæ* is widely distributed in Nature. The natural reservoir is said to be the rat (*Rattus rattus* and *Rattus norvegicus*). The species we caught here belong to the former variety. The occurrence of the spirochæte in field rats explains why the disease is so common amongst the agricultural class, and it is through the urine and fæces excreted by these rats that the infection is stated to be generally carried to man. These leptospiræ have been found in slime in the roof of coal mines, in river and mud water, and even in drinking water and tap water. These water-leptospiræ are said to attain virulence on passage through such animals as monkeys, pups, rabbits and guinea-pigs, which are considered especially susceptible. Rat-fouled food is also said to be capable of producing the disease. But there may be some other and perhaps still more important and commoner factors responsible for conveying the disease to man, but they are so far not known. The leptospiræ are found in the urine, fæces, cerebro-spinal fluid and sputum of patients.

With regard to sex, the disease seems to be mainly confined to males, although its occurrence in females has been recorded. Here it is the occupation of the males that is primarily responsible, more than the sex. In Port Blair during the last two years we have not noted any case in the female sex and there seems to be so far no reference in the published records of the previous years to show that it ever occurred in women.

As regards occupation, those of the agricultural class and miners are said to be particularly liable. In Port Blair its occurrence has been noted amongst the self-supporting convicts of the cultivating class and others whose duty requires them to work in mud and water for prolonged periods. In the present series our experience is more or less the same. The occupation in the present series was as follows:—

Self-supporting cultivators	..	..	5
Free cultivator	..	..	1
Self-supporting garden coolies	..	..	3
Self-supporting road coolies	...	..	11
Self-supporting domestic servants	..	..	1
Self-supporting saw mill cooly	..	..	1
Munshi (self-supporter)	..	..	1

Out of these, the first twenty-one were exposed to mud and water for prolonged periods during work though their occupations seem to be slightly different, and so support the views held during previous years. The last two, however, were not exposed to any such conditions and in these cases careful enquiry strongly suggested that the infection must have been carried in a manner other than the usual one. For these reasons these two cases are interesting.

Locality.—During previous years the cases which have been reported occurred chiefly from the Western District. In the present series, however, they appear to have been more sporadic. The case distribution of the present series was as follows:—

<i>Eastern District.</i>		<i>Western District.</i>	
Phoenix Bay	.. 1	Naya-Shashr	.. 1
Middle Point	.. 2	Chatham	.. 1
Atlanta Point	.. 4	Wymherley Gunj	1
Phargaon	.. 8	Tusnabad	.. 1
Taylorabad	.. 1	Munglutan	.. 1
Aberdeen	.. 1	Port Moat	.. 1
—		—	
TOTAL	.. 17	TOTAL	.. 6

On these figures it would seem that most of the present series came from the Eastern District; but there may be fallacies in this. Atlanta Point includes the jail, and the cases here may have been admitted from the Western District, or a "carrier" imported from the same area. Taylorabad is practically Western District, or at least the conditions there are similar to those in the Western District. The men at Phargaon may have slept there, but during the daytime may have worked in the clay in the Western District or have been on jungle and forest labour there. Hence the difference in local incidence from previous outbreaks is not so marked as might at first sight be apparent.

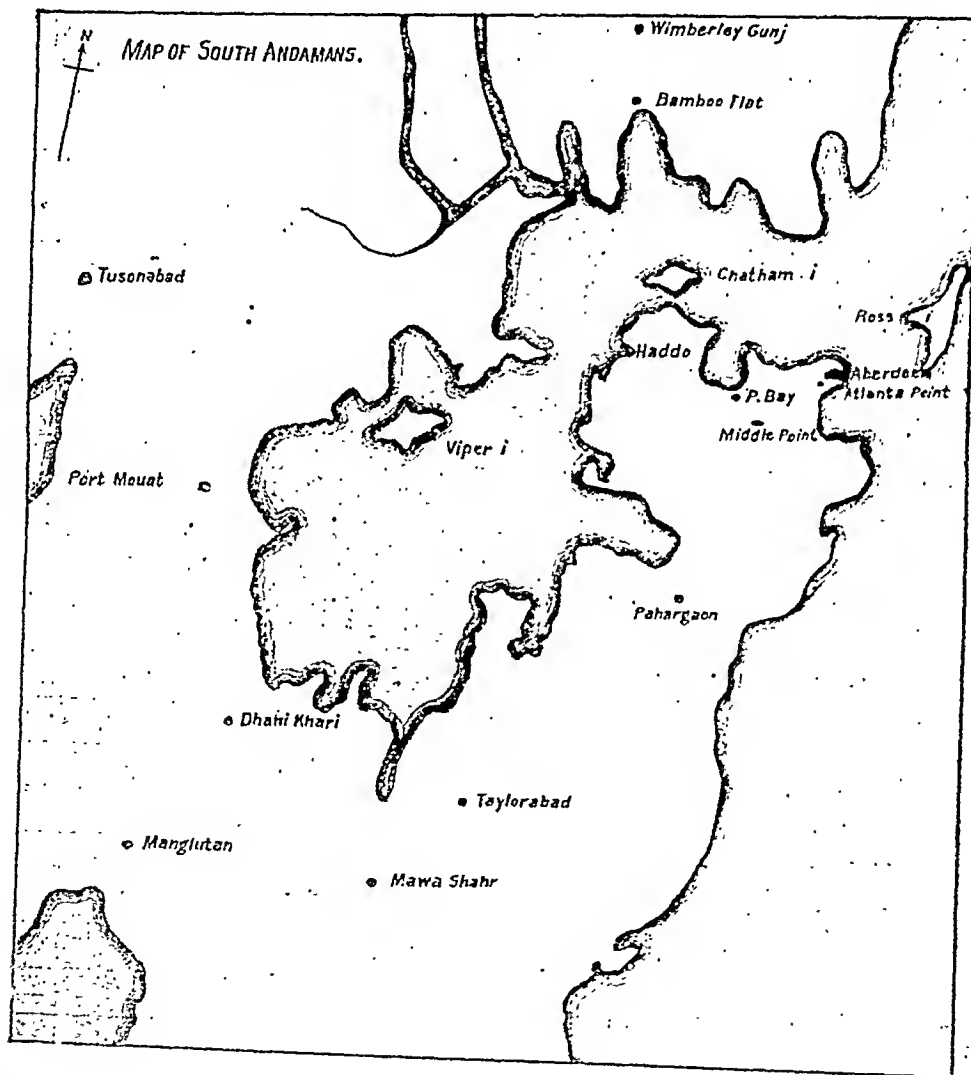
This also shows that the localities where the cases occurred were scattered all over.

Seasonal Incidence.—Cases have been stated to occur in the Andamans mostly from October to the end of January, although stray cases have also been stated to occur during September. In the series under reference however four cases occurred during the month of August which is of interest. References have been made during previous years to these cases being possibly of malarial origin. In this connection it is of interest to note that in the present series most of the cases of infectious jaundice occurred at a time when the malaria curve in the Settlement

was nearly at its lowest. This is shown by the following figures:—

Month.	Total number of cases Weil's disease.	TOTAL NUMBER OF MALARIA CASES.		
		Microscopic.	Clinical	Total.
June ..	0	35	12	47
July ..	0	76	24	100
August ..	4	71	39	110
September ..	3	48	55	103
October ..	11	14	36	50
November ..	4	15	33	28
December ..	1	6	18	24

F. The fever is said to last from three to eleven days, but is usually very irregular in character. Within a few hours of onset of the fever violent myalgic pains are complained of all over the body, neck, back, loins and limbs, those at the thighs and calves being about the worst, so much so that even the most gentle movements of the lower extremities make the patients shriek. With this there may arise restlessness, intense headache, constipation, nausea, vomiting and anorexia, and there is nearly always some prostration, which may vary according to the severity of the case. The temperature after the first two or three days may fall to normal, or may keep to about 101°F. or below. Then there comes on the injection of



The significance of the early or late rains and the amount of rainfall with regard to their relationship to the incidence of the disease seem to be an important but complex problem for practical study and investigation.

Symptomatology.—The incubation period is stated to be 5 to 6 days in experimental animals. It has varied from 6 to 13 days but is usually 6 to 8 days. To describe a typical case, the onset is sudden with fever ushered in by chills and rigors, the temperature rising to 103° or 104°

the conjunctivæ which may make the eyes look blood-shot, and by about the fourth day or a little later jaundice supervenes. This is first seen in the conjunctivæ, and later is generalised. It becomes progressively intense and may last for several days. With jaundice, nephritic signs and hæmorrhages may become evident, the latter occurring as epistaxis, hæmoptysis, hæmaturia and melæna. Spontaneous bleeding from the gums is common, and bright red blood may be passed with the stools when hæmorrhages occur.

lower down into the gut. There may be enlargement of the liver, which may be tender, and the same may happen, though rarely, to the spleen. The lymphatic glands (particularly the axillary and inguinal sets) may be enlarged and may be painful and tender. As regards the nervous symptoms there may be delirium (wild, or of the low muttering type), coma, and convulsions. The urine is scanty in the beginning, generally acid in reaction, and may contain albumin, bile, and tube casts. The pulse, though quick in the beginning, becomes relatively slow and is generally full and bounding. The respirations are usually hurried during the acute phase. By the second week a rash may develop, which it is said is generally confined to the chest but may cover the entire body. Secondary fever is not of infrequent occurrence but with this the symptoms are, as a rule, not aggravated. The tongue during the course of the disease usually shows a dark brown rather peculiar fur, which may be central or may cover the dorsum entirely. By the third week generally convalescence becomes established, its duration depending upon the severity of the case.

I shall now submit an analysis of the symptoms as were found present in the series under consideration.

Pyrexia.—This was "irregular" as will be seen from the temperature charts I have brought to show you. The temperature was in no case above 103°F. , and has usually kept to 101°F. or below. Secondary fever will also be noticed in a few cases; in one case on the 8th day, in another on the 11th, in two others on the 13th, and in the last case on the 31st day after the initial temperature first fell to normal. In connection with pyrexia the following points are important to remember:—

1. That the termination of the initial fever does not mean the setting in of convalescence. The temperature may drop to normal or sub-normal, yet the acute phase may continue and a fatal issue at this stage is not uncommon. Thus 2 of our fatal cases of this series and 2 fatal cases of the year 1925 had normal temperature on admission to hospital and shewed no rise at all up to the time of death;

2. It is therefore no real guide to the severity or otherwise of the case;

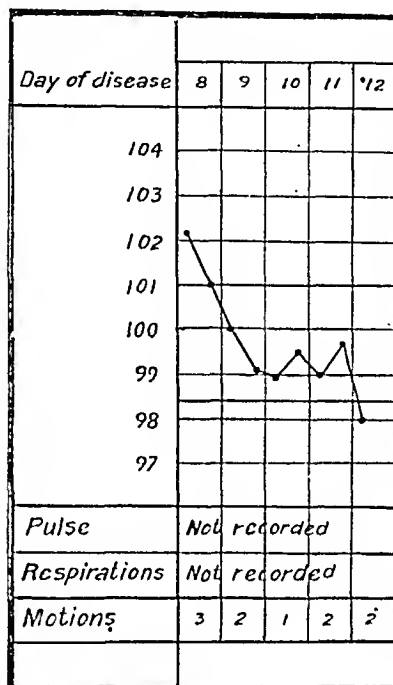
3. That by itself it is of little prognostic value; and lastly,

4. That with the onset of secondary fever there is no aggravation of the symptoms, nor is jaundice intensified—a feature directly opposite to that seen in yellow fever in its reactionary stage.

Pulse.—This in no case was "dangerously rapid" as has sometimes been described. Only one patient had a pulse up to 124 per minute. Usually quick in the beginning, it was subsequently slow, and in all cases it was full and bounding; but by this I do not mean to convey that there was any high blood pressure. Two

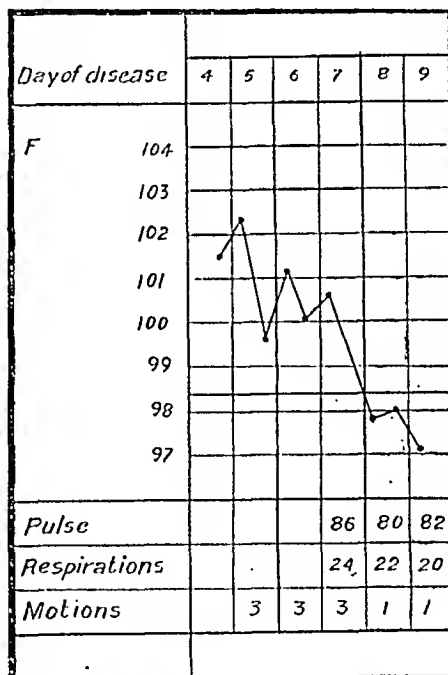
cases were admitted with intermittent and irregular pulse, yet in character it was full and

No. 45583. (Recovery)
Name—K. Saidali Date of Adm.—9-9-26.
Disease—Weil's disease (mild case).
Misdiagnosed S. F. F.



bounding. These were put on to digitalis and did subsequently quite well.

No. 41499. (Recovery)
Name—Daudali Date of adm. 9-10-26.
Dis—Weil's disease,

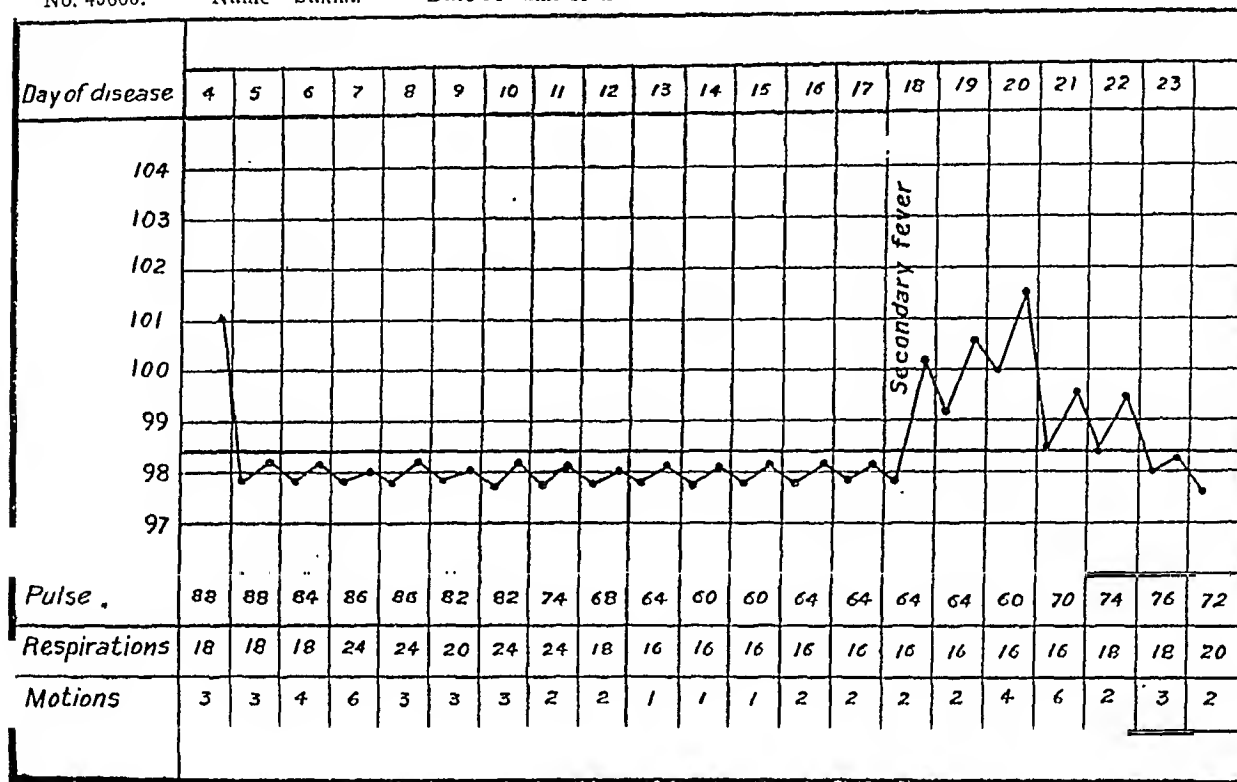


Respirations.—These were generally accelerated, as will be seen from the charts in most cases.

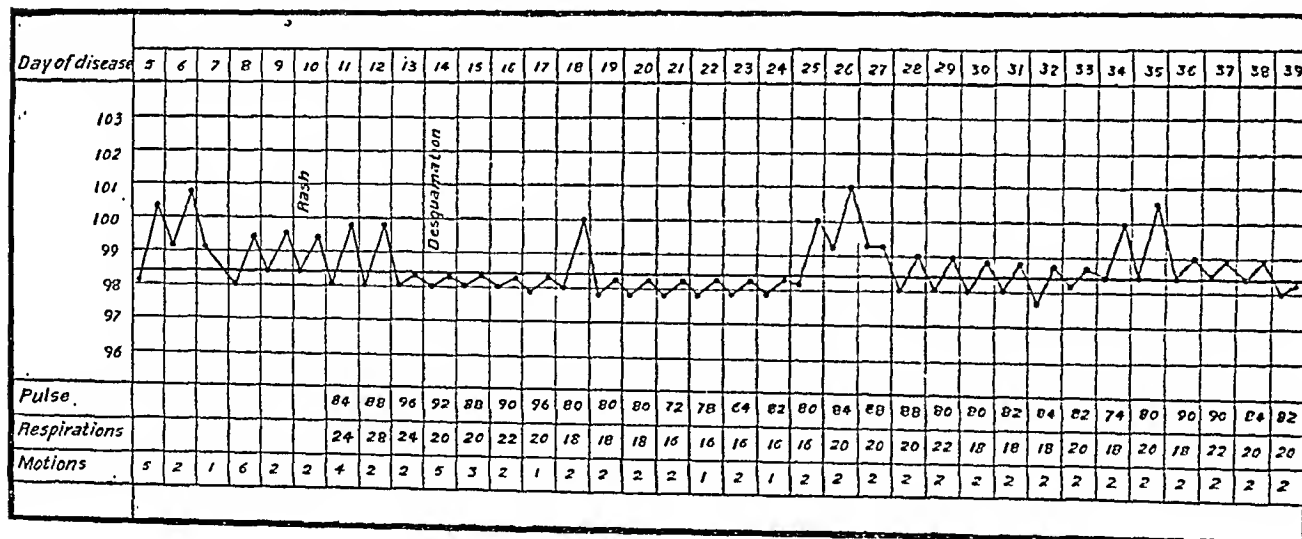
Muscular pain.—This seems to be a very early and a very constant feature, and was absent in none. The pains set in with or within a few hours of onset of the fever. At any rate they

Prostration.—This seems to come on soon after the pains and varies in degree. The patient looks acutely ill and anxious, and seems to be in a state of exhaustion. Prostration of more or

No. 43660. Name—Sukha. Date of admission—11-10-26. Disease—Weil's disease. (Recovery.)



No. 46906. Name—Khazansingh. Date of admission—1-10-26. Disease—Weil's disease. (Result—Recovery.)



were not delayed more than twelve hours in any case. Although the pains were complained of all over the body those about the thighs and calves were particularly the worst, so much so that even the most gentle movements of the lower limbs made the patients shriek. Concomitantly there was complaint of a feeling of burning sensation all over the body, and about the urethral canal during the act of micturition by a few, and restlessness was common to all in varying degrees.

less severity was present in every case, and appeared to be a very constant and a striking early feature.

Injection of the Conjunctivæ.—This also takes place very early, probably by the second day, but how soon after the first feeling of illness I cannot exactly say. No cases reported on the third day of illness, but in none of those admitted was it ever found absent on the third day of illness. Twenty cases had literally "blood-shot" eyes.

Two cases had it also, but in mild degree. The importance of conjunctival injection in the diagnosis of the disease is especially stressed by Buchanan in his recent monograph on it. The last case of the series was a sick transfer from Tushabad in whom the jaundice was so intense that the previous redness was completely replaced. In summing up the early and constant features I may say that before the supervention of jaundice, pyrexia, pains, and prostration plus conjunctival injection may be regarded as sufficient to warrant a diagnosis of Weil's disease in places where it is known to be endemic.

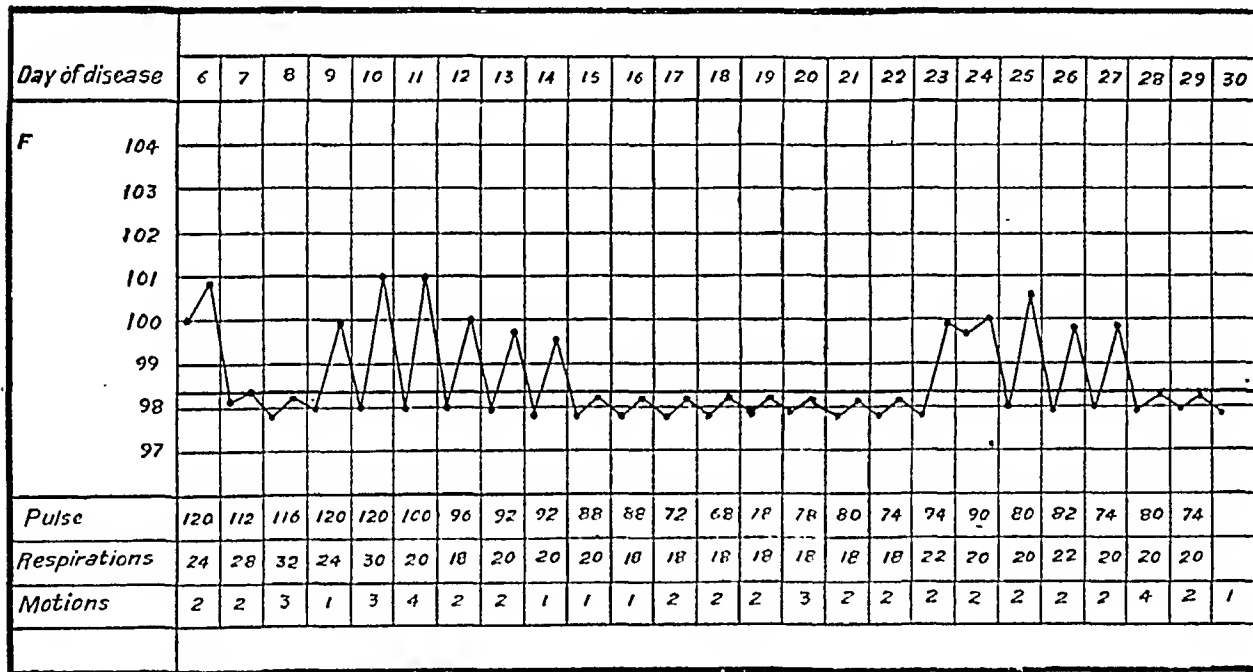
Jaundice.—This usually appeared between the fourth and the sixth day—in those cases however that developed it. Some of us perhaps cannot think of Weil's disease without thinking of the presence of jaundice, and it is here that I should

diagnosis of our so-called sandfly-fever,—cases which we have now no doubt were really cases of infectious jaundice. Out of a total of 23 cases those that developed jaundice were 14 in number, whereas 9 escaped it. These nine were mild in nature. The jaundice after its first appearance in the conjunctivæ begins to deepen and then becomes generalised. It then lasts for some days before it finally clears up. In our cases it lasted from seventeen to twenty days, but in two cases it took well over a month to disappear completely.

Tongue.—A dark brown fur which seems to be fairly peculiar was evident. It was sometimes central, with the edges clean, and sometimes covered the entire dorsum of the tongue.

Stools.—The characteristic stools of jaundice, i.e., white and clay coloured were encountered in only seven cases out of fourteen that developed

No. 46202. Name—Fazal Ilahi. Date of admission—13-10-26. Disease—Weil's disease. (Result—Recovery.)



like to emphasize the fact that jaundice, though frequently associated with should not be regarded as an invariable feature of Weil's disease, and that *absence of jaundice should not be interpreted as meaning absence of Weil's disease*. Indeed it is recorded that only 40 per cent of the cases in France during the Great War had jaundice. Cases can and do terminate at the stage of conjunctival injection, and these cases are as a rule mild; and it is here that the disease is most likely to be either completely overlooked or misdiagnosed as sandfly-fever or dengue, more especially the former. Thus five cases of our series that occurred from Phargaon in August and September were diagnosed as sandfly-fever. As these cases attracted our attention careful notes were kept, and it was the subsequent occurrence of two typical cases with intense jaundice (while some of the above cases were still in hospital) that suddenly disillusioned us as regards the

jaundice. The remaining sixteen—including seven cases with jaundice—had normal bile-stained stools.

Urine.—This was generally scanty and high coloured. In one case there was complete suppression, so much so that on catheterization not a single drop could be recovered. Prior to catheterization the patient complained of agonizing hypogastric pain, which evidently may have been partly due to the complete dryness of the mucous membrane of the bladder. This was a fatal case and died of both suppression of urine and a terminal pneumonia.

(a) Odour: Nothing peculiar; often aromatic; normal.

(b) Specific Gravity: This varied from 1010 to 1020.

(c) Reaction: Acid in 11, alkaline in 10, and in two specimens were not available (in one due to suppression).

(d) Albumen: Present in 9; absent in 12, specimens not available in two.

Absence of albumin and the alkaline reaction were probably due to large doses of alkalis and liberal fluid intake immediately after admission.

(e) Bile: It has already been mentioned that 14 cases only developed jaundice. It is rather surprising to find that bile reactions were positive in only four. In one no specimen was available, and 9 gave negative reactions, although visual examinations in every specimen pointed directly to the presence of bile. The reason why nine cases with jaundice should have failed to show the presence of bile on applying the usual tests is not exactly known. *Reference to the literature on infectious jaundice shows that in this disease bile may disappear from the urine at any time and it appears that it usually does so quickly.* This may be one of the reasons accountable for the negative reactions and hence the recommendation and the necessity for examination of urine between the fifth and the eighth day, when it is said that a drop or two of acetic acid to about an inch of urine gives an intense green reaction. In our cases I must confess that these examinations were not necessarily carried out between these days.

In this connection I should like to point out that some of the urines on being stood for over 12 hours separated out into two clearly visible layers, the upper one showing a greenish tint and the lower a dark or dirty brown. The significance of this, if any, is not known.

(f) Sediment: This was nearly always present in some quantity and under the microscope showed as:

1. Triple phosphates.
2. Stellar phosphates.
3. Tyrosin crystals.

(g) Tube casts: These were found in only one case.

Generally speaking, as the symptoms subsided the high coloured urine returned to the normal colour. No hard and fast rules could however be laid down in this connection, since in two cases the urine persisted to be highly coloured for over a month although these patients were otherwise quite well.

Hæmorrhages.—These were noticed in 8 cases.

Serial Nos. 1 and 19 of the table had hæmorrhages from the bowels. No. 9 had epistaxis. No. 11 had epistaxis and bleeding from the gums. No. 14 had epistaxis and profuse hæmorrhages from the bowels, kidneys and the gums which actually seemed to threaten death. An ophthalmoscopic examination by Dr. Naidu showed that he had retinal hæmorrhages also. No. 15 had bleeding from the gums and hæmoptysis of mild degree. No. 18 had also hæmoptysis lasting for three or four days. No. 23 had spontaneous bleeding from the gums, epistaxis, hæmoptysis, hæmatemesis and hæmorrhages from the bowels, of which the patient finally died.

Rash.—This was noticed in one case only, first appearing on the 10th day of the disease, more or less like a sudaminal rash. The same evening it became papular and well defined; next day it coalesced and became typically "measly," remaining so for a day more. The following day it slightly faded in colour and on the 14th day desquamation began, the skin peeling off in huge big patches almost the size of a palm. This went on for over a fortnight when desquamation was completed. The rash covered the entire body, but the mucous surfaces were free.

Enlargement of the Liver and Spleen.—Enlargement of both organs was noted in 10 cases, of the spleen alone in 4, and of the liver alone in 2 cases. The remaining 7 showed no enlargement whatever of either the spleen or the liver. Thus a total of 14 had splenic enlargements. Out of these 9 showed definite records of having suffered from malaria, attacks of which varied from one to thirteen in number. The remaining 5 had no records but their history showed that they had previously suffered from malaria. *Thus the splenic enlargement in practically all cases was undoubtedly of malarial origin.* It will be of interest to point out that out of the 4 who were new arrivals in Port Blair, the 2 who had enlarged spleens gave a history of having suffered from malaria. One had an attack in Port Blair two months previously, and the other suffered from it, he stated, while in Multan. Thus it will be seen that the enlargement of the liver (in 12 cases altogether) seems to be of frequent occurrence and this was often attended with some pain and tenderness.

Association of Malaria.—This was found present in one case only, blood examinations having showed malignant tertian crescents.

Hiccough.—This was present in one case at a time (16th day) when jaundice was also intense, but it was not continuous nor very severe.

Vomiting.—Moderate vomiting was seen in 8 cases.

Appetite.—Complete anorexia in the beginning was marked, but appetite was soon regained and became ravenous long before convalescence had set in. This rather unusual feature was most striking and was present in all the cases without an exception.

Insomnia.—This was usual but not of high degree; the pains accounting for it in the initial stage, and perhaps hunger for a period before convalescence had set in.

Nervous Symptoms.—Delirium was present in 3 cases; of the violent type in two and low muttering type in the other one; the latter had sub-sultus tendinium also. Coma and convulsions were not met with.

Special Senses.—Dimness of vision was complained of in one case that had retinal hæmorrhages, and deafness and ringing in the ears was complained of by another.

Serous Membranes.—One case developed dry pericarditis. He had much præcordial pain and distress.

Lymphatic Glands.—Suppurative parotitis requiring incisions developed in one case during the secondary fever. Enlargement of the lymphatic glands was not specially looked for, but in three cases lately seen at Bamboo Flat Hospital the axillary and the inguinal sets were found enlarged and tender.

Skin.—In all cases this was flushed and dry and was jaundiced in four. In one the jaundice was deep; in the other three it was moderate. There was no pruritus in any case. *Edema of the feet and ankles.* This developed suddenly in two cases, in one on the 13th and in the other on the 22nd day of illness, clearing up in one in about a fortnight and in the other in about 10 days. *This was an interesting and a rather unusual feature, as no reference to such edema seems to have been made in the literature on infectious jaundice.*

Blood Picture.—The red blood cells are destroyed and consequently reduced in number. It is said that the hæmoglobin value falls by about 50 per cent. There is some leucocytosis with an increase of the polymorphonuclears in the beginning, and later of the lymphocytes. Buchanan in his monograph on the disease emphasizes relative lymphocytosis as an important diagnostic feature in the disease, basing his view on the disease as observed in experimental animals.

In the present series enumeration of the red cells was not done. Total leucocyte counts were done once only on admission and so also the differential leucocyte counts. To be really instructive such examinations should have been carried out more frequently during the course of the disease. However, the results obtained were as follows:—

The total leucocyte counts varied from 3,125 to 36,256 per c. mm. and except for 4 or 5 cases, leucocytosis was not marked. The increase in the lymphocytes was however very striking. Of lymphocytes, if 23 per cent be regarded as a normal average, 20 of our cases had a definite lymphocytosis, 9 having shown quite 35 per cent or more. The hæmoglobin value recorded during convalescence showed reduction by about 30 per cent.

Case Mortality.—We had 3 deaths. This means roughly a mortality of 13 per cent, but this is not to be regarded as a general standard, for in 1925 we had 3 cases—all fatal—and this would mean a cent per cent mortality. It is said that the mortality varies in different countries but it seems that in one and the same place too it may vary within wide limits, depending upon the severity or otherwise of the cases concerned.

Diagnosis.—Detection of the organism under the dark ground is by far the best. The usual blood staining methods come next. Smears from specimens of centrifugalized urine could likewise be stained and a search made for the leptospiræ.

The acetic acid and Russo-methylene blue tests of the urine are valuable aids in diagnosis. Guinea-pigs may be inoculated intraperitoneally with 6 c.c. of the patient's blood, preferably within three days of onset, when the animal dies by about the 10th day of intense jaundice. Instead of blood the same quantity of a catheterized specimen of urine may be employed and this may prove useful even if done a little later, since it is said that the leptospiræ of Weil's disease may begin to appear in the urine from the 10th day onwards and may persist up to even 100 days.

Here it is important to remember that the positive findings are unfortunately rare and negative results are of common occurrence. A negative result therefore need not necessarily mean negation of the disease.

In the present series dark ground illumination was not done for want of a "star" lamp and in a few cases where search was made for the leptospiræ by staining methods this gave negative results. Intra-peritoneal inoculations were carried out in seven guinea-pigs, with blood in four, and with urine in three, including inoculating material from two cases which eventually terminated fatally. Three of our guinea-pigs died on the evening of inoculation or the following morning. They were all examined post-mortem, and no trace of visceral jaundice was evident. The remaining four are alive to this day and are perfectly healthy. These inoculations were done between the 3rd and the 27th day of the patients' illness. The results in the year 1925 were also the same.

Post-Mortem Appearances.—Briefly, there is universal congestion and intense jaundice. The latter involves practically everything and spares almost nothing. It involves the skin, mucous membranes—including that of the gut and the bladder—the conjunctivæ, the serosa, the deep tissues, and all the organs such as the heart, lungs, liver, spleen and the kidneys, which may be enlarged. The liver may be enormously enlarged and its weight may be twice or thrice the normal. It is usually firm on section and there is a moderate degree of fat necrosis present. The kidneys are similarly highly congested and enlarged and the weight may be double the normal or more. The bladder as an organ is jaundiced, including the lining mucous membrane inside. The brain and the meninges are not exempt. The jaundice involves even the bones, as becomes evident at the cut ends of the ribs while opening the thoracic cavity, so that everything appears highly congested and intensely jaundiced—so striking a post-mortem picture that once seen it can never be forgotten. Patches of inflammatory hyperæmia of varying sizes at the sites of hæmorrhages into the bowels, as may be expected are usual.

Differential Diagnosis.—(1) To yellow fever allusion has already been made. (2) The seven-day fever of Japan, although a leptospiral disease, is mild. There is no rash, no pains and

no mortality. (3) Sandfly fever is usually though not always a three-day or one-phase the patients suffering from the disease is important. To distinguish patients from

Serial Number.	Differential Count.			Nervous Symptoms.	Vomiting.	Diarrhoea.	Hiccough.	Special Senses.	HAEMORRHAGES.						Serous Membranes.	Rash.	Ravenous Appetite before convalescence.	Suppurative parotitis.	
	Lymphos.	Large Monos.	Eosinophiles.						Gums.	Stomach.	Bowels.	Nose.	Lungs.	Kidneys.					
1	26%	2%	1%	—	+	+	—	—	—	—	+	—	—	—	—	—	+	+	Severe case.
2	18%	10%	2%	—	+	—	—	—	—	—	—	—	—	—	—	—	+	—	
3	27%	3%	..	—	+	—	—	—	—	—	—	—	—	—	—	—	+	—	
4	39%	8%	1%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
5	22%	6%	2%	—	+	—	—	—	—	—	—	—	—	—	—	—	+	—	
6	27%	23%	2%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
7	24%	2%	..	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
8	46%	..	..	Wildly delirious	—	+	—	—	—	—	—	—	—	—	—	—	+	—	Severe case.
9	28%	4%	4%	—	—	—	—	—	—	—	—	+	—	—	Dry pericarditis	+	+	—	Do.
10	22%	7%	..	—	—	—	—	—	+	—	—	+	—	—	—	—	+	—	
11	31%	7%	..	—	—	—	—	Deafness	—	—	—	—	—	—	—	—	+	—	
12	32%	..	1%	—	+	—	—	—	—	—	—	—	—	—	—	—	+	—	
13	35%	8%	2%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
14	33%	1%	..	Low muttering delirium	+	—	+	Dimness of vision	+	—	+	+	—	+	—	—	+	—	Severe case.
15	9%	5%	..	—	—	—	—	—	+	—	—	—	+	—	—	—	+	—	
16	2%	3%	3%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
17	6%	5%	..	—	+	—	—	—	—	—	—	—	+	—	—	—	+	—	
18	10%	2%	..	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
19	26%	6%	6%	—	—	—	—	—	—	—	+	—	—	—	—	—	..	—	Severe case
20	9%	15%	3%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
21	9%	10%	5%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
22	7%	2%	1%	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	
23	12%	4%	2%	Violent delirium	+	—	—	—	+	+	+	+	+	—	—	—	..	—	Severe case.

in 4 cases serum from convalescent patients was used in from 1 to 4 c.c. doses intravenously. But the dose employed was too small to study the therapeutic effects.

Prophylaxis.—This resolves itself into waging war against rats. Drainage of the soil, where possible, is also recommended. Adequate disinfection and incineration of faeces and urine of

1. Rogers. *Fevers in the Tropics*, 3rd Edn.
2. Byam and Archibald, *The Practice of Medicine in the Tropics*, Vol. 2.
3. Rolleston, *The Medical Annual*, 1926.
4. Manson-Bahr. *Tropical Diseases*, 1925 Edn.
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6. Woolley, *Indian Med. Gaz.*, November 1911 and July 1913.
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Serous Membranes.—One case developed dry pericarditis. He had much præcordial pain and distress —

The acetic acid and Russo-methylene blue tests of the urine are valuable aids in diagnosis.

vary within wide limits, depending upon the severity or otherwise of the cases concerned.

Diagnosis.—Detection of the organism under the dark ground is by far the best. The usual blood staining methods come next. Smears from specimens of centrifugalized urine could likewise be stained and a search made for the leptospiræ.

or inflammatory hyperæmia of varying sizes at the sites of hæmorrhages into the bowels, as may be expected are usual.

Differential Diagnosis.—(1) To yellow fever allusion has already been made. (2) The seven-day fever of Japan, although a leptospiral disease, is mild. There is no rash, no pains and

no mortality. (3) Sandfly fever is usually though not always a three-day or one-phase fever; besides the absence of jaundice, absence of mortality, absence of hæmorrhages and nephritic symptoms and presence of pains behind the eye-balls are important. (4) In dengue the joint pains, the terminal rise of temperature making up the two-phase fever, the rash and the epidemicity are classical features. Besides, it is as a rule not a fatal disease, and jaundice is absent. (5) In black-water fever, paroxysms of fever, hæmoglobinuria, and increase in the large mononuclears are characteristic. (6) Relapsing fever need present no difficulties. The *Spirochaeta recurrentis* is very different from the leptospiræ and is very easily recognised. Besides there are no blood-shot eyes, no hæmorrhages, and the jaundice is not so intense. The temperature chart is also characteristic and salvarsan preparations bring about a magical cure. (7) In acute yellow atrophy reduction in the size of the liver, as opposed to the enlargement of the same organ in Weil's disease, should be remembered. (8) And lastly as for catarrhal jaundice I may say that the course of this disease will at once settle the diagnosis.

Treatment.—Absolute rest, careful nursing, a preliminary purge, large doses of alkalies, a very liberal fluid intake, and early fomentations over the loins for fear of suppression of urine are all of great benefit. Pains may be relieved in the usual way, and so also the hæmorrhages. It is said that nothing is more useful for the latter and our own experience was also the same.

Polyvalent anti-leptospira serum in 20 c.c. doses, at several hours interval, at least four times in succession is said to be by far the best treatment. In the absence of this, sera from convalescent patients may be employed in the same doses.

Careful dieting before and during the convalescence is necessary, and it should be carefully borne in mind that the ravenous appetite is untimely. Fats are not to be recommended.

The salvarsan preparations are of no use and presumably also the mercurials.

The treatment in the present series consisted of sodium salicylate injections, 10 grains in 10 c.c. of water intravenously on the first two days, and large doses of alkalies by mouth, combined with sodium salicylate and ammonium chloride.

For hæmorrhages, chloride or lactate of calcium by the mouth and injections of adrenaline were employed, but without any significant result.

In 4 cases serum from convalescent patients was used in from 1 to 4 c.c. doses intravenously. But the dose employed was too small to study the therapeutic effects.

Prophylaxis.—This resolves itself into waging war against rats. Drainage of the soil, where possible, is also recommended. Adequate disinfection and incineration of fæces and urine of

the patients suffering from the disease is important. In discharging patients from the hospital it has to be remembered that the *Leptospira icterohæmorrhagica* is capable of persisting in the urine up to 100 days into convalescence and therefore such patients may possibly act as carriers of the disease during this period, and may consequently materially help the spread of infection.

Conclusion.—In conclusion, I shall only draw your attention to the three special features of this series and these are:—

1. The seasonal incidence;
2. The locality with regard to the occurrence of cases; and
3. The absence of jaundice in mild cases (39 per cent).

(1) This is the first time that cases are reported to occur in the month of August. (2) As to the locality one and all the cases of Lt.-Col. Barker's series from 1921 to 1924, occurred invariably from the Western District. It is remarkable that a large number of cases of the present series occurred from the Eastern District area, including fatal and severe cases. (3) Thirdly, the occurrence of mild cases terminating at the stage of conjunctival injection (i.e., without developing jaundice) is of special interest. Whether such cases were encountered by Lt.-Col. Barker or not I do not know, but no reference to any such cases seems to have been so far made by him or anyone else previously in the Settlement. As the diagnosis of such cases would be debatable, it is possible that the inclusion of the most typical cases only in the series would have been considered justifiable or else it is possible that they were overlooked. During Lt.-Col. Barker's time I hear there used to be a standing order for all the cases of jaundice to be evacuated to Ross Island from outside hospitals. And if the order evidently referred to cases of jaundice only, it is not surprising that cases where there was no jaundice were either lost sight of or misdiagnosed.

Stokes, Ryle, and Tytler, reporting on Weil's disease in the British Army in Flanders state that "of 47 cases diagnosed as Weil's disease, clinically or by communication of the disease to animals, 74 per cent developed jaundice and 26 per cent have not shewn any coloration." In another place they state: "We cannot say definitely in how many cases of Weil's disease jaundice occurs as a clinical sign, but we estimate that it does not occur in more than 60 per cent of cases in the epidemic with which we are dealing."

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CONJUNCTIVITIS VERNALIS OR SPRING CATARRH OF THE CONJUNCTIVA.

A STUDY OF SEVEN CASES.

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VERNAL catarrh of the conjunctiva is not really rare in this part of South India, a large number of cases escaping notice being mistaken for other more common forms of conjunctivitis which occur in large numbers about the same time of the year as this disease, namely, April to July. Though not so destructive of vision as trachoma with its numerous complications and sequelæ, yet its annoying and often distressive symptoms, its chronic course—sometimes extending to several years—its great refractoriness to treatment, its occurrence in the educational period of life—involving economic loss—its wide difference from other affections of conjunctiva in regard to its causation, prognosis and treatment—all these call for a careful observation and study of this disease.

The disease was first described by Arlt of Vienna in 1846. (1) Saemisch (1876) named it "Spring Catarrh of the Conjunctiva" from its seasonal occurrence and exacerbation. Horner (1889) described the characteristic growth on the tarsal conjunctiva. Herbert (2) (1903) described the eosinophilic infiltration of the new tissue and the eosinophile increase in the blood.

Having discovered two cases in the early part of 1926, my assistants and myself watched for cases in the summer and picked out a number of probable cases whose conjunctival discharges were examined, and a number who were definitely diagnosed as suffering from vernal catarrh were kept under close observation and studied in greater detail. The observations in 7 such patients have been tabulated in the accompanying statement. In all cases a fairly comprehensive examination of the entire system was made, including analysis of the urine, examination of the fæces for helminths, of the blood cell picture, coagulation time, and sometimes also for the Wassermann test. These cases were observed for periods ranging from three weeks to four months, except Case No. VI who is an old case under my observation for last 8 years. Besides this series of 7 cases, there have been 10 others treated subsequently in this institution on whom general observations have been made without a detailed study.

The main points noticed were:—

(1) *Heredity, etc.*—There was no hereditary or familial tendency in any case, other children—sometimes brothers or sisters—living under identical conditions being unaffected. There was no hereditary syphilis and the Wassermann reaction was negative when tested.

(2) *Sex and Age.*—All the 7 were males between 14 and 20 years of age. In the subsequent 10 cases 9 were adolescent males and one a female aged 20 years.

(3) *Occupation, Climate, Season, etc.*—Of these seven, 6 were students, one an agriculturist. Of the subsequent ten, 8 were students, one a house-wife and one a cook. Of the 7+10=17 cases one came from Trichinopoly with a hot climate, 15 from the various parts of the Mysore plateau, and one from Coimbatore belonging to the same region. All the 7 cases came in the summer, though other cases have come less frequently all round the year. Most of the patients complained of worse symptoms in summer and relief on the occurrence of rains.

(4) *Diet and Habits.*—All were strict vegetarians, except one subsequent case who was a Mahomedan. Most were town-bred high caste Hindus.

(5) *Toxæmias, Infection, etc.*—All the 7 were free from worms, intestinal or other toxæmia, pyorrhea alveolaris, tuberculosis or other intercurrent disease.

(6) Both eyes were invariably affected. Itching was more or less constant, being sometimes intense. Photophobia was nearly always present, sometimes extreme, so that the patient walked with head bent. Cases Nos. II and VI showed great watering and sneezing. A tendency to sneezing was present in most cases.

(7) The palpebral type was less common, only 2 out of the 7 showing the typical granules. The limbal type was more frequent. In 2 cases both were found. In 2 cases of this series, as well as in a few of the subsequent cases, there was a slight dusky discoloration in the area of the inter-palpebral fissure similar to that in cases of deficiency diseases (xerosis of the conjunctiva or early keratomalacia). Perhaps these patients had an early symptom of this condition along with vernal catarrh.

(8) In all except Case No. IV there was an abnormal and often unhealthy condition of the nose and throat. Case No. VI gave a history of frequent colds also. Smell was unaffected.

(9) A smear of the sticky thread-like conjunctival discharge or of a scraping from the tarsal surface stained with Leishman's stain showed numerous eosinophiles. In fact these cases were diagnosed on this fact, and other cases with symptoms similar to these, but without eosinophiles in the discharge, have been left out of account. We are now studying such cases also as being probably transitional or early stages of the same disease as mentioned by Sobhey Bey of Egypt (3).

(10) Blood examination showed a distinct eosinophilia. There was no leucocytosis and no increase in the coagulation time of the blood. One case showed a leucopenia, and lymphocytosis was observed in some.

(11) None had any corneal or other complication and no serious refractive error.

(12) Bacteriological examination by smears and cultures showed no pathogenic organisms—*B. xerosis* and *Micrococcus epidermidis albus* were sometimes found.

(13) *Treatment*.—Was fairly effective during the time the cases stayed here.

The following measures were employed.

Local—(a) Protective glare glasses—this relieved the photophobia, the blepharospasm and sneezing to some extent. Beyer (4) says that exclusion of air has a salutary effect. Neither the partial exclusion by these glasses nor the complete exclusion by pad and bandage or by a modified Buller-shield seemed to have any additional value.

(b) Every eye was treated with boric lotion wash twice daily with instillations of adrenalin drops, and calomel dusting and gentle massage at bed time with a little yellow ointment (Ung. Hyd. Oxidi Flava $\frac{1}{2}$ per cent) put in. When discharge was copious the lids were everted and the conjunctiva swabbed with silver nitrate solution (5 grs. to 1 oz.), and washed with saline, and argyrol solution (5 per cent) instilled. When itching was great and in the tarsal cases Knapp's roller forceps was used with amelioration of symptoms. In Case No. VI, who has been under observation and treatment for several years, repeated application of roller forceps, shaving off of the tarsus with the scalpel, applications of strong silver nitrate solution up to 60 grs. to 1 oz., repeated application of carbon dioxide snow (some of these measures under chloroform), copper sulphate application, prolonged use of Zambelletti's unguentum cupro-argenti, instillations of fibrolysin solution, dionine drops, sub-conjunctival saline injections were all employed at one stage or another. Though symptoms would appear abated a little, yet my feeling has been that the treatment had no great influence on the course of the disease.

Though application of silver nitrate dilute solution, as also acetic acid solution, relieved the itching and discharge in some patients, yet its indiscriminate use in others produced a worse condition than before, adding to the specific conjunctivitis a chemical irritative inflammation. On the whole, silver nitrate appears unsuitable to the cases we meet with here.

General—(a) *Dietetic*.—The patients were put on a vitamin-rich diet, but it seemed to have no visible effect. Similarly cod liver oil and in one case sodium morrhuate injections were of no value.

(b) *Medicinal and Operative*.—All these 7 cases were put on a mixture containing calcium

lactate in doses of 10 to 15 grs., three times a day. It is said (5) that calcium deficiency is probably a cause. In addition they were given injections of nuclein twice daily; this was with the idea of producing a leucocytosis and changing the abnormal picture of the white corpuscular element of the blood which is an outstanding phenomenon. Great improvement was observed in every one of these patients, and I am inclined to credit the calcium and nuclein treatment with this good result.

(c) Case No. VI was treated for some time with hay fever vaccine, as well as with an auto-vaccine prepared from the nasal cavity.

Treatment of Nose and Throat.—All cases except Case No. IV were treated with swabbing the throat with protargol solution daily. In cases of unhealthy noses a menthol and eucalyptus ointment (menthol gr. v. oil of eucalyptus m.x., vaseline 1 oz.) was snuffed into the nose twice daily. Brinton (6) of Johannesburg considers that follicular tonsillitis or other trouble of that organ is the cause of vernal catarrh in South Africa and that cure follows enucleation of the tonsils. Though symptoms were ameliorated by medicating the nose and throat along with other measures, we did not find any great improvement in two other cases (not in this series) who had their tonsils taken out.

The constantly bilateral nature of the affection, the blood changes, the general lymphatic enlargements observed by some writers (Ticho (7)) indicate that this disease is probably an ocular manifestation of a constitutional disturbance. Some think that calcium metabolism is at fault; while others consider it a condition of vagotony (8). The considerable preponderance of young adolescent males (90 per cent, Ball (9) 92.31 per cent. Ticho (7) may indicate an imbalance of the internal secretions at least as a predisposing factor. Rizzo has described abnormal secondary sexual characters in practically all of his eleven cases. Except in Case No. II of our series where they were ill-developed there was no abnormality.

If one may be permitted to conjecture, perhaps the key to the proper understanding of this disease lies in a complete knowledge of the origin, function and fate of the eosinophile leucocyte in the blood. The well known textbooks are silent on the point. Bond (10) says that "eosinophiles seem to be a distinct variety or race of leucocytes and not merely polymorphonuclears which have acquired eosin-staining granules as the result of feeding on hæmoglobin," and concludes that "the life-history of the eosinophile cell and its relation to other varieties of leucocytes requires further study."

Seventeen years ago, inspired by a paper by Sir Pardey Lukis (then Colonel Lukis, Principal of the Calcutta Medical College) on the blood condition of Bengalee students of his institution,

and under the guidance of Professor Colonel Donovan of Madras, I studied the leucocytic distribution in nearly 100 Madras Medical College students and to my surprise found that several students had an eosinophilia of 10, 15, or 20 per

cent (in 2 cases more than 50 per cent) but were free from the usual causes of eosinophilia and apparently perfectly healthy. Further investigation was not made and unfortunately I have lost these records.

Tabulated Statement of Observations on 7 Cases of Vernal Catarrh of Conjunctiva.

No.	Race, sex, age.	Occupation.	History, etc.	Symptoms and appearances.	Blood.	Conjunctival discharge.	Nose and throat.	General health.
I.	A. R. Hindu, male, 16	Student	Duration 3 months. After a short malarial attack, eyes became red and watering along with sneezing attacks.	Both eyes slightly red and watery. Great photophobia and much sneezing. Great itching, particularly at inner canthi. Upper palpebral conjunctiva congested. Pale red gelatinous elevated irregular growth encroaching on cornea irregularly.	Total count R. B. C. 7,920,000 W. B. C. 3,500 <i>Differential.</i> Poly. 49.0 Lymph. 44.0 Eosino. 16.0 <i>Later after treatment.</i> Poly. 62.0 Mono. 4.0 Eosino. 14.0 Lymph. 20.0 Coagulation time 4 mins.	Epithelial cells and leucocytes majority being eosinophiles <i>B. Xcr + +</i>	Nose big and nostrils too roomy. Deviated septum to right. R. inf. tub hypertrophied. Obstructed breathing R. side. Tonsils enlarged. Granular relaxed pharynx.	Good. Delicate-looking. Urine, Faeces B.P., etc., normal. Sexual development normal.
II.	N. I. Hindu, male, 20	Agriculturist.	Duration 3 years. Aggravated during summer months but better after rains. Treated in various places by regular practitioners and quacks.	Both eyes affected. Redness and watering. Very great photophobia and itching. Blepharism and sneezing marked. Head bent and forehead furrowed and pseudoptosis. Palpebral conjunctiva congested and velvety; upper tarsal conjunctiva has the typical flattened "cobble-stone" granules. Prominent, gelatinous, raised irregular encroaching, limbal appearance.	R. B. C. 6,200,000 W. B. C. 5,600 Poly. 46.6 Lymph. 28.4 Eosino. 25.0 <i>Later.</i> Poly. 46.0 Lymph. 40.0 Eosino. 12.0 Coagulation time 4.5 mins.	Eosinophiles + + +	Chronic granular pharyngitis and chronic follicular tonsillitis present. L. inf. turbinate enlarged and breathing difficult in L. nar's.	Fairly good. Secondary sexual characters not well developed.
III.	R., Hindu, male, 14	Student	Duration 8 months. Now and then aggravated.	Both eyes affected. Burning, itching and slightly watering. Slight redness. Tarsal conjunctiva shows flat topped granulations of different sizes. Limbal gelatinous growth marked on the 2 sides and absent above and slight below.	Poly. 44.0 Lymph. 40.0 Eosino. 16.0 <i>Later.</i> Poly. 52.9 Lymph. 18.0 Mono. 4.6 Eosino. 16.0 Coagulation time 2.4 mins.	Eosinophiles + + + <i>B. xerosis + M. albus +</i>	Granular pharynx. Tonsils healthy. Slight septal deviation of nose.	Good.
IV.	A. S., Hindu, male, 15	"	Duration 1 year. Aggravated at times, but symptoms and appearances better with rubbing.	Both eyes affected. Eyes slightly pink and slight watery. Much itching. No sneezing. Palpebral conjunctiva normal. Limbal growth moderate. Sclera slightly dusky at interpalpebral area.	Poly. 42.0 Lymph. 41.0 Eosino. 17.0 Coagulation time 4 mins.	Eosinophiles + +	Healthy.	Good.

No.	Race, sex, age.	Occupation.	History, etc.	Symptoms and appearances.	Blood.	Conjunctival discharge.	Nose and throat.	General health.
V.	K. M., Hindu, male, 19	Student	One year's duration. Aggravations now and then. No sneezing.	Both eyes affected. Eyelids heavy and drooping. Eyes watery. Ocular conjunctiva appears dusky and limbal gelatinous appearance prominent. Follicular appearance of pal conj.	Poly. 55'0 Lymph. 35'0 Eosino. 9'0 R. B. C. 51,200,403 W. B. C. 7,760 Coagulation time 3'5 min.	Eosinophiles +++ B. xerosis ++	Slight granules in pharynx. Slight deflection of nasal septum.	Good.
VI.	G. K. R., Hindu, male, 20	"	Duration 10 years. Started with "sore eye." Condition gets worse—usually in summer but also rarely at other times. Treated in various ophthalmic and other hospitals with operation, injection and local applications. Has generally improved in symptoms.	Both eyes affected. Conjunctiva slightly congested. Typical tarsal cobble-stone pavement—Cartilaginous growths present in other areas follicular. Slight blepharospasm and some photophobia. Sneezing prominent at times.	Poly. 51'0 Eosino. 29'0 Lymph. 29'0 Later. Poly. 57'0 Eosino. 18'3 Lymph. 25'0 Coagulation time 3'4 mins.	Eosinophiles +++	Hypertrophic rhinitis at present. Frequently suffers from colds.	Good.
VII.	A. S., Hindu, male, 17	"	Duration 18 months. Worse in summer. Itching and sneezing at times.	Both eyes affected. Thick limbal greyish growth. Photophobia slight.	Poly. 60'0 Lymph. 22'0 Eosino. 18'0 Coagulation time 4 mins.	Eosinophiles ++	Deviated nasal septum.	Good.

May it be that eosinophilia indicates a metabolic aberration within health limits with a predisposition to vernal catarrh, the exciting causes being climatic, seasonal or otherwise?

CONCLUSIONS.

- (1) Cases of vernal catarrh of the conjunctiva are fairly common in the table-land of Mysore and adjoining parts.
- (2) Adolescent males are most commonly affected—especially in the late summer months. Most of the patients were vegetarian Hindus.
- (3) Caustics and operative treatment seem to do no good, but calcium salts and nuclein had a perceptibly good effect.
- (4) Most of the patients had unhealthy nose and throat conditions, treatment of which seemed to improve the eye condition.

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DYSENTERY IN SECUNDERABAD.*

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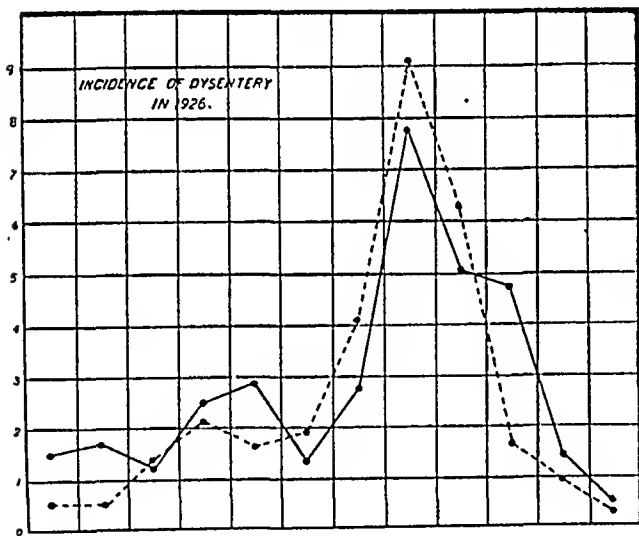
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Or all diseases that incapacitate a soldier dysentery is one of the most important. It was a scourge of the ancient armies and proved to

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be the same in the Great War, with this difference that we were much better acquainted with its ætiology and hence were in a better position to prevent and treat it. It has been fully recognised that without the aid of the laboratory the accurate diagnosis of the disease—if not altogether impossible is no easy matter, and the danger of the indiscriminate use of emetine has been fully brought home. In view of these facts an effort was made to correctly classify all cases passing blood and mucus in their stools. The following is a summary of the work carried out from January 1926 to October 1927.

Incidence of Dysentery among British and Indian Troops.—The ubiquitous nature of the disease is well known. We find it prevailing throughout the year to a greater or a lesser degree. The numbers per month are shown on the accompanying chart. It will be observed therefrom that the Indian troops suffered much more than the British, but in both cases a similar seasonal variation is present. From a few cases in the first six months, there is sudden jump in July which reaches its climax in August, and gradually comes down to normal in November.



	J.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
British ..	1.48	1.74	1.22	2.60	2.88	1.24	2.73	7.80	5.10	4.70	1.42	0.36
Indian ..	0.70	0.55	1.39	2.13	1.63	1.85	4.15	9.18	6.23	1.74	0.96	0.26
	British Indian					Continuous line. Dotted line.						

Laboratory Findings.—As the laboratory results are always judged by the technique employed, the following gives in brief the details of the procedure adopted in dealing with all stools.

1. The stool, after testing the reaction with litmus paper, was examined microscopically for its exudate. From the stool a flake of mucus was picked up on a platinum loop, introduced into a test tube of sterile saline (to remove any extraneous bacteria, etc.), and plated out on bile-salt-litmus-lactose-agar. After 24 hours' incubation, suitable colonies were picked out and tested for motility by a hanging drop preparation; on their proving non-motile they were transferred

to glucose and mannite sugar media containing Andrade's indicator. The organisms fermenting glucose or glucose and mannite were further inoculated from these tubes into lactose, dulcitol, and peptone tubes (for the indol reaction). Finally, serological reactions were used to confirm the result of the bio-chemical reactions.

2. No diagnosis of amœbic dysentery was based on exudate alone, and, if in addition to the pathogenic amœbæ, a bacillary exudate was present, an attempt was always made to isolate the causative bacilli by the cultural methods detailed above. The presence of a scanty exudate, consisting of a few lymphocytes and eosinophile cells, sometimes with Charcot-Leyden crystals, was an indication for a prolonged search, hence attention was always concentrated in such cases on finding the *Entamoeba histolytica*.

Adopting the above methods we obtained the following results:—

Total number of cases with mucus or blood and mucus	404
Number of cases from which <i>B. dysenteriae</i> were isolated	178
Number of cases in which <i>Entamoeba histolytica</i> was found	43
Number of cases showing a bacillary exudate, but pathogenic amœbæ or bacilli were not found	101
Number of cases showing an indefinite exudate only	82

Taking the above figures into consideration, and working out percentages, we find that of all cases showing mucus or blood and mucus

69.06 per cent. were bacillary (including those from which *B. dysenteriae* were isolated and those showing bacillary exudate).

10.64 per cent were amœbic.

20.3 per cent were indefinite (no specific exudate, no pathogenic amœbic or dysentery group of organisms having been detected).

Of the 279 "bacillary" cases noted above we find that the *B. dysenteriae* group could be isolated from over 63.8 per cent of cases, or taking the indefinite cases into consideration in 49.3 per cent.

The following numbers show the variety of the organisms encountered.

Total number of cases from which successful isolation was made	178
Number of cases showing <i>B. Flexner</i> group	147
Number of cases showing <i>B. Shiga</i>	22
Number of cases showing <i>B. Schmitz</i>	9

Serological identification could only be carried out in a few cases of the Flexner group. The inagglutinability of the recently isolated cultures of these organisms is too well known to be discussed here. At first an attempt was made at sub-culturing, but this had to be abandoned to save confusion reigning in the laboratory and reports getting into arrears, especially in the "dysentery season" when the number of stools dealt with in a day sometimes exceeded forty.

It will be observed that the percentage of Shiga infections is fortunately small, and that the majority of the bacillary infections are due to the members of the Flexner group. It would have been most interesting to work out the actual strains, their toxicities as well as their relation to the sera from the cases themselves, but owing to lack of facilities and the rush of work this could not be carried out fully.

Seventy-nine of the cultures isolated locally were put up against polyvalent high titre serum obtained from the Central Research Institute, Kasauli, out of which fifty were agglutinated (without sub-culturing repeatedly). This 63 per cent. positive agglutination proves the futility of the method advocated by some workers of classifying the organisms after picking up colonies from the plates and doing direct agglutination. A high titre serum was also produced from two typical local strains by injections of rabbits as described by Manson-Bahr and Perry (*Practice of Medicine in the Tropics* Byam and Archibald. Vol. II, p. 1110). These sera agglutinated their respective strains up to a dilution of 1:2,500, and by putting them up against the standard Oxford emulsions of the various strains of *B. Flexner* group and doing the "absorption" test it was found that the original cultures belonged to "V" strain. Twenty out of the twenty-five cultures isolated locally were agglutinated by this serum. It is highly probable that the V strain is the leading one in Secunderabad amongst the Flexner group of organisms.

It need hardly be added that no organisms were diagnosed as *B. Shiga* unless they were agglutinated by the high titre Shiga serum.

The Source of Infection.—Whatever the vector of the causative organisms, the main source of infection is undoubtedly the "carrier," whose distribution must be far and wide in this cantonment. The laboratory examination for carriers is not as much of a success as one would like it to be. Our routine has been to examine three normal stools for entamœbæ, cysts, ova, etc., and three after a saline purge for bacillary dysentery. For the latter purpose the stools are plated out and dealt with as described in the first part of this paper. That this dangerous source of infection exists in the civil population will be evident from the following data:—

Total number of menials examined .. 838
Total number found positive for *B. Flexner* .. 28 or 3.4 per cent.

Total number in which *Entamœba histolytica* cysts were found .. 28 or 3.4 per cent.

It may be interesting to note here that *B. typhosus* was isolated from five of these cases.

The number of positive results, small though they are, show the importance of the examination of menials concerned in the handling of food: or, putting it in another way, we might say—surrounded as the troops are on all sides by the enemy (carriers), the importance of

eliminating the same from within the lines is a preventive measure of the first order.

SOME INTERESTING OBSERVATIONS.

1. *Reaction of Dysenteric Stools.*—One hundred and fifty-nine stools brought to the laboratory with blood and mucus from which *B. dysenteriae* group were isolated are especially chosen for discussion here. It was found that 144 or 90.6 per cent of these were alkaline to litmus and the rest, i.e., 9.4 per cent gave an acid reaction. The latter phenomenon was noted specially in stools which had been despatched to the laboratory after a delay of two or more hours.

The number of our amœbic cases is too small to give any definite opinion as regards their reactions, but in all the six cases of mixed infection (see below) the reaction was alkaline, so that the alkaline reaction alone would not be sufficient to eliminate the presence of pathogenic amœbæ.

2. *Exudate.*—Out of the 178 cases from which specific bacilli were isolated 129 or 72.5 per cent showed a definite bacillary exudate at the first examination, while a few exhibited it at a later date. The rest, i.e., showing no bacillary exudate, were of a milder nature containing a large amount of mucus but little blood, all being due to the Flexner group of organisms.

As has been pointed out before, no diagnostic importance was attached to "amœbic" exudate or Charcot-Leyden crystals, their presence being interpreted as a hint for prolonged search.

3. *Mixed infections* were encountered in six cases during the whole year. It may be coincidence but all six cases began as bacillary dysentery and the pathogenic amœbæ were found on or after the fourth day.

4. *The Importance of Time in Examination of Specimens.*—That time is a great factor in successful isolation is shown by the following facts:—

Total number of stools from the British Military Hospital situated quite adjacent to the laboratory ..	165
The causative bacilli were cultivated from ..	76 or 46 per cent.
The total number of stools received from the Indian Military Hospital, a mile and a half away ..	252
Total number from which <i>B. dysenteriae</i> were cultivated ..	87 or 34.5 per cent.

CONCLUSIONS.

1. From the above we can safely conclude that bacillary dysentery is a far more prevalent disease than the amœbic type. The medical officer who uses emetine or allied drugs without laboratory diagnosis would be wrong in nearly nine cases out of ten.

2. It has been possible to cultivate the causative organisms from nearly fifty per cent of cases, but with the proper co-operation of the medical officers it would be possible to obtain much better results.

3. The carrier problem, here as elsewhere, is very important in Secunderabad among the civilian population.

Finally, we would like to say that the inspiration to classify the dysentery cases scientifically was mainly derived from the paper on "Important features in the correct diagnosis of Dysentery in India" by Major J. A. Manifold, D.S.O., R.A.M.C., and our technique as detailed above is identical with the one described by him.

A Mirror of Hospital Practice.

A CASE OF HYDATID CYST OF THE LIVER.

By W. L. HARNETT, M.A., M.B., F.R.C.S. (Eng.),
LIEUT.-COL., I.M.S.,

*Officiating Professor of Surgery, Medical College,
Calcutta.*

RAM CHAND MISRA, Hindu, aged 8, was admitted to the Medical College Hospital, Calcutta, on 3rd August, 1927. His home was in the Mozufferpur district of Bihar and there was nothing of importance in the previous history. He stated that his parents had dogs living in the house, but no history of any close association with them could be elicited. The history given was that one year ago a swelling had been noticed in the epigastrium. It was about 1 inch in diameter when first noticed, hard, rounded and painless. It had gradually increased in size and become slightly tender. Except for an occasional attack of vomiting and one attack of diarrhoea, there had been no symptoms. He had had no fever during this period.

The boy was well nourished and of healthy appearance, the temperature and pulse were normal and the tongue was clean. In the epigastrium was a globular swelling about 3 in. by 2½ in., it was smooth and of regular outline on palpation, fluctuating and moving freely with respiration. It extended downwards about four fingers' breadth and the upper margin could not be defined. There was no pulsation and no hydatid fremitus. It was approximately on the middle line, extending rather more towards the right and the liver edge was barely palpable beyond the tumour. On percussion the tumour was dull, the dullness being continuous with the liver dullness, and there was no increase of liver dullness in the upward direction. The thoracic organs were normal, no other tumour could be palpated in the abdomen and there were no enlarged glands any where. The urine contained no abnormal constituent. The stools contained ova of *Ascaris* and of *Trichuris*, but no other parasites and no occult blood. The blood count was—

Total white cells	14,700 per cmm.
Polymorphonuclears	.. 51 per cent.
Lymphocytes	.. 24 per cent.
Large mononuclears	.. 2 per cent.
Eosinophils	.. 13 per cent.

An x-ray examination after a barium meal showed the stomach distorted into a curved form with concavity upwards, from which the existence of a tumour pressing down on to it could be inferred. The liver moved freely and no enlargement could be detected with certainty. The emptying time of the stomach was normal and the 6-hour and 24-hour radiograms showed nothing noteworthy.

From the physical signs it was plain that the patient had a cyst in the left lobe of the liver and the diagnosis lay between amoebic abscess, hydatid cyst, cavernous angioma and a tumour undergoing degeneration. The latter appeared incompatible with the good general condition of the boy, and a cavernous angioma is usually a pulsating tumour. The absence of fever is not sufficient to negative liver abscess, especially as there was a well marked leucocytosis, but a liver abscess which has reached the stage of protruding through the abdominal wall is always adherent and fixed and has the vague outline of an inflammatory swelling shading off into normal tissues. The diagnosis of hydatid cyst appeared then the most probable. The eosinophilia would have been valuable confirmatory evidence had it not been for the presence of ova of *Ascaris* in the stools. There was no history of attacks of urticaria and no hydatid fluid was available with which to perform a complement fixation test.

After the removal of the round worms in the usual manner, operation was performed on 31st August, 1927. The abdomen was opened by a right paramedian incision above the umbilicus. A tense rounded tumour, of a pale pink colour, which appeared to protrude through the gastro-hepatic omentum with the stomach wrapped round its lower border came into view. The tumour occupied the whole of the left lobe of the liver, which was converted into a cyst, with the exception of a narrow fringe of liver substance on the lower segment of the cyst. The right lobe of the liver was unaffected. After packing off the neighbouring viscera, the cyst was aspirated and 280 c.c. of clear colourless fluid was drawn off. The fluid contained innumerable solid specks, which on microscopic examination proved to be masses of scolices. An incision was then made into the liver substance and a large cavity was opened. Lying free in this was the true cyst wall, a friable white membrane looking like boiled egg albumin. By careful separation with the finger this was manipulated out of the wound and removed practically entire. Two or three daughter cysts were found floating free in the cavity. The cavity in the liver was partly sutured and a Carrel's tube placed in position for continuous irrigation. The progress of the case was uninterrupted for three weeks, by which time the wound was healed except for a small sinus. A rise of temperature and some abdominal pain then necessitated the reopening of the sinus and the evacuation of a collection of bile-stained mucus in the cavity, which was found to be still

of considerable size. Free drainage and continuous irrigation with E. C. lotion brought the temperature down rapidly and the cavity is at the time of writing nearly filled up. The figure shows a section of the cyst wall in which the endocyst with a "brood capsule" of scolices is well seen.



Hydatid disease is not common in India, presumably because there is not that close association between dogs and human beings which obtains in sheep raising countries, such as Australia and New Zealand, where the disease is so common that 12 to 15 per cent. of the annual death-rate is due to this cause. The *Tania echinococcus* is parasitic only in the dog, wolf and jackal, the dejecta of these animals soil grass and vegetable matter, by the ingestion of which the ova pass into the bodies of sheep and cattle, in which the cysticercus stage is passed. The infection is transferred back by the dog eating contaminated offal of sheep. Man can only act as the host of the cysticercus stage and the infection is usually conveyed by the contamination of drinking water with ova-containing faeces, but it may also be conveyed by too close association with infected dogs, allowing them to lick the hands or face; as probably happened in the present case.

The technique of the surgical treatment of these cases has been much improved by the method of Désé, which consists in the injection of 1 per cent. formalin into the cyst after aspiration, to destroy the endocyst with its brood capsules. The cyst is then removed and the liver sewn up without drainage. This method is applicable to all cases in which there is no suppuration, provided that an effusion of bile is not already present. Such cases should be drained, as the bile is already infected. Under this technique 75 per cent. of cases heal aseptically and in the remainder a septic effusion occurs and the wound has to be reopened, as in the present case. The high leucocytosis in this case suggested that infection was commencing and

that drainage with continuous irrigation might lead to quicker healing.

A CASE OF PROBABLE DERMAL LEISHMANIASIS.

By AMULYA KUMAR BHATTACHARYYA, L.M.P.,
Medical Officer, Dalgram Dispensary, Tushbhandar,
Rangpur.

SERATULLA, aged about 35 years, Mahomedan male, consulted me on the 3rd March 1927 for 'dermatitis exfoliata,' the duration of the disease being about two years. There was no history of syphilis or of any hereditary disease. He had not suffered from prolonged fever, and there was no enlargement of the spleen. Both the upper and lower extremities were extensively affected, but the trunk was almost free. The scalp was also affected.

He was put on to Fowler's solution orally, and ichthyol and chaulmoogra oil for external application. Injections, each of $\frac{1}{2}$ gr. of iodine, were also given twice a week. After a month's treatment there was no appreciable change in his condition. At this stage my attention was drawn to the case of 'dermatitis exfoliata' cured by injections of urea-stibamine, reported by Dr. Norrie in the *Indian Medical Gazette* for March, 1927, p. 142; and to an article on dermal leishmanoid by Dr. B. M. Das Gupta in the April 1927 number of the same journal, p. 199.

I accordingly changed the treatment, and from the 19th April 1927 commenced intravenous injections of a 2 per cent. solution of sodium antimony tartrate, the initial dose being 2 c. c. Up to the date of writing (25th July 1927) the patient has in all received 8 injections, the largest dose being 4 c. c. The patches have completely disappeared, with the exception of a very few on the thigh, and his skin has resumed its normal appearance.

The case could not be examined microscopically or serologically; but, considering the immediate and striking effect of the antimony injections on the disease, it would appear that the condition present was one of 'dermal leishmanoid.'

CONJUNCTIVAL CONGESTION AFTER UREA-STIBAMINE INJECTION.

By NAGENDRA NATH ROY, B.Sc., M.B.,
Sohagpur, P. O. Belkuch, Patna District.

NASERALI MOLLA, a Mahomedan youth, about 18 years old, was receiving bi-weekly injections of urea-stibamine from me for treatment of his kala-azar from the 29th May 1927, with favourable results. A curious feature of the case, however, is that five minutes after each injection both his conjunctivæ become extremely red and congested, and this condition lasts for about two hours. The initial dose of urea-stibamine was 0.05 gm., gradually rising to 0.20 gm. The acute congestion of the conjunctivæ is accompanied by fits of sneezing.

During the past three years, I have treated 175 cases of kala-azar with various compounds of antimony, but this is the only case which I have seen of its type. The condition was not accompanied by coughing, vomiting, dyspnoea, urticaria, itching, oedema or collapse.

A CASE OF CEREBRAL MALARIA.

By J. F. HENRIQUES, I.M. & S., B.M.S.,

Officer i/c West Hospital, Rajkot.

A HINDU girl, aged 14 years, was first seen by me on the 8th September 1927, with a temperature of 105°F., a pulse of 160, and in an unconscious state. I suspected cerebral malaria, but first took a blood film in order to make certain of the diagnosis, for the abdomen was markedly retracted like that in cerebrospinal meningitis, and her condition was very serious. Before leaving the house, and after taking the blood film, I gave her an intramuscular injection of gr. vii of quinine.

Two hours later, as sub-tertian parasites had been found in the film, and the diagnosis of malaria was thus confirmed, I visited the patient again, and administered gr. vii of quinine intravenously, with m.x. of adrenalin chloride solution. The temperature at the time was 104.5°F.

This was followed by profuse perspiration and the temperature dropped to 102°F. at 7 p.m. the same evening, but the patient was still unconscious. Early next morning, she was conscious, with a temperature of 101°F. I gave another intramuscular injection of gr. vii of quinine.

On the 10th, I administered oral quinine, as the patient much objected to the intramuscular injections, which were painful, and also gave plasmochin orally. In the evening the temperature rose to 102°F. and she again became unconscious. Owing to her tossing about, it was not possible to give an intravenous injection, so a further dose of gr. vii of quinine was given intramuscularly. The next day, she was semi-delirious, but able to swallow medicine, and quinine was given orally. Finally she made a complete recovery on quinine medication.

The interesting features of the case were:—

(1) On the day prior to my seeing the patient, she had had fever of remittent type with rigors for four days, and the temperature had never fallen below 101°F. The doctor then in charge had given instructions that quinine was to be given when the temperature fell below 100°F.; but this never happened, so the patient went on to develop cerebral malaria. Many medical men still refuse to give quinine to malarial patients whilst the temperature is elevated, despite the teaching of text-books to the contrary, and the old-fashioned and erroneous view that quinine should not be given during the febrile phase still persists. The golden rule should be to give quinine as soon as the bowels have been opened, or to administer it alternately with an alkaline mixture.

(2) Secondly, the large amounts of quinine which had to be given to this patient of 14 years of age to get the fever under control; viz., 1st day gr. 7 intramuscularly and gr. 7 intravenously; 2nd day, gr. 7 intramuscularly; 3rd day 7 gr. intramuscularly, two tablets of plasmochin, and 25 grs. of quinine by the mouth; 4th day, gr. 5 of quinine intravenously, and three plasmochin tablets; 5th day, quinine gr. 25 in solution orally, and three tablets of plasmochin; 6th day, the same as on the 5th day. Her temperature did not reach normal until the 6th day.

I am much indebted to Colonel Tyrell, I.M.S., for the suggestion to give a first intravenous injection of quinine and then to follow it up by an intramuscular injection of quinine; the idea being in the first instance to secure the maximal immediate action of the drug, thereafter to be reinforced by slower absorption from the intramuscular injection.

CASES OF MALARIA IN A FAMILY.

By Capt. S. B. MUKERJI, M.B.,

Civil Medical Officer, Kursong.

A HINDU male child living here, who had been exposed to infection in the foothills to both malaria and kala-azar, developed irregular intermittent fever, with loss of appetite, irregularity of the bowels, anaemia and emaciation. The liver and spleen became enlarged, the latter reaching to the umbilicus. The aldehyde test carried out by my assistant, Dr. B. K. Biswas, was reported to be partially positive.

After four injections of urea-stibamine, the patient's condition was not improved. Blood films, sent to Calcutta, did not show any malaria parasites, but the leucocyte count was suggestive of that disease. Quinine had been given rather irregularly and without effect, but on the strength of the Calcutta report, quinine was given intramuscularly, followed by regular doses of quinine by the mouth. The child made a rapid recovery.

The parents also went down with fever. In the case of the mother, no parasites could be found in blood films, and the aldehyde reaction was partially positive. By way of comparison, the serum of a patient suffering from kala-azar, and who had been under successful treatment with urea-stibamine for some time, was taken; this gave a positive aldehyde test, though only after the lapse of some time.

The father went down with fever five weeks after the child, and in his blood film sub-tertian malarial parasites were found. The aldehyde test was not carried out in his case.

As a contrast to the above cases one may mention that of a child of about 3 years of age, who had been treated for irregular fever with enlargement of the liver and spleen, and advanced stomatitis. He had had prolonged treatment with quinine in his village before I saw him. I had no urea-stibamine available at the time, so put him at once on to injections of sodium

antimony tartrate. He did so well that, when the urea-stibamine ordered arrived, the parents refused to pay for it, preferring the cheaper sodium antimony tartrate. The injections were given by Dr. S. K. Biswas.

Points in connection with such cases are (1) what is the diagnostic value of a partially positive aldehyde test? (2) What caused the entire absence of malarial parasites in these febrile, and non-quininised cases, which were certainly cases of malaria? (3) Why did the mother and child show partially positive aldehyde tests?

A CASE OF RETROGRADE STRANGULATED HERNIA.

By K. M. NAYAK, L.M. & S.,

Assistant District Medical Officer, North Arcot,
Vellore.

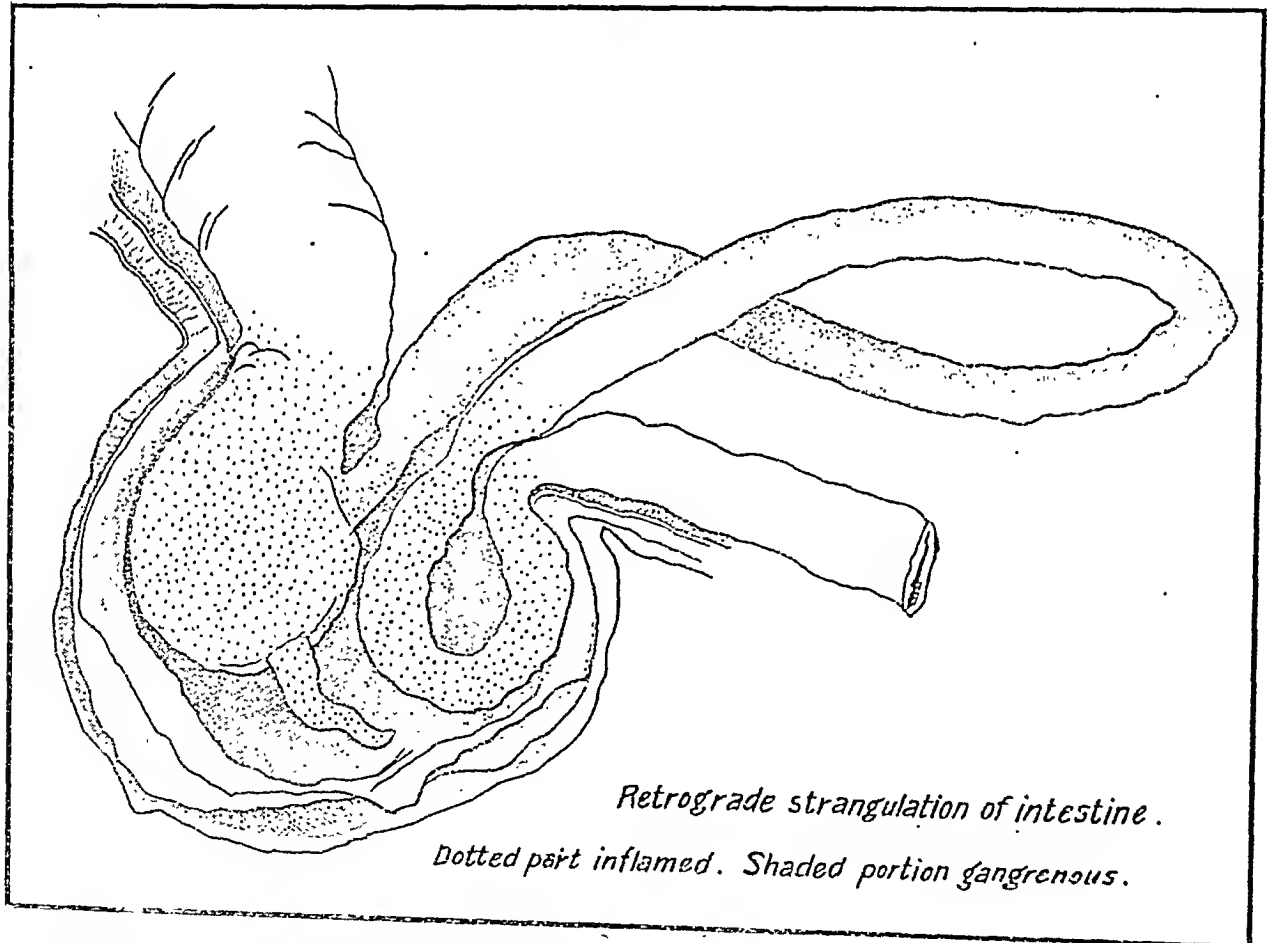
THE following case seems to me to be worthy of record, owing to the rarity of the condition described, and it may be of interest to those who

hours to bring him in, and he was first seen at 8 a.m. on the 1st October, 1927.

His condition on admission was very bad. Pain in the tumour had practically ceased; the temperature was subnormal; the pulse slow, thready, and almost impalpable. In other words, he was in a severely toxic state and completely collapsed, and the first question which I had to answer was whether he would stand the shock of an operation.

As operation, however, was the only chance of saving life, continuous hot saline was administered *per rectum* from 8 a.m. till 10 a.m., when the patient was placed on the operating table, and injections of adrenalin and pituitrin given. When placed on the table he was packed in warm blankets and hot water bottles, and the apparatus for intravenous saline was got ready. The patient stood the actual operation itself apparently well, though it lasted nearly three-quarters of an hour.

I was under the impression that I was going



are called upon to carry out emergency operations in India.

The patient, a man aged about 55 years, was admitted to the Pentland Hospital with strangulated hernia on the morning of the 1st October, 1927. The hernia was of about the size of a coconut, and had suddenly become strangulated about 10 p.m. the previous night. As the patient lived some 10 miles from the hospital, it took ten

to deal with an ordinary "common or garden" type of strangulated inguinal hernia. The seat of the strangulation was at the neck of the hernial sac, as usual, but the strangulated coil was not in the sac at all, but in the abdomen. This is a very rare type of strangulated hernia.

On opening the sac two nearly normal loops of small intestine were found,—a W-shaped hernia. In addition to this, the sac contained the

cæcum, the appendix, the end of the ileum, and the previously mentioned loops of ileum. These were all in a healthy condition, whilst the sac contained a lemon-yellow fluid, apparently due to a condition of hydrocele. The tumour was about the size of a cocoanut.

On drawing down the intra-abdominal loop of small intestine, an intermediate portion, about six feet in length, blackish, and in a condition of gangrene, was brought into view. To carry out a resection and an end-to-end anastomosis was impossible, owing to the critical state of the patient, for his pulse was failing and he was gasping for breath. The gut was returned to the abdomen; the incision sutured, and a pint of saline with adrenalin run into the median cephalic vein. The patient died about half an hour after he had been taken back to the ward.

Although very uncommon, retrograde strangulation is an extremely grave condition, and the lesson which such cases teaches is this; that the contents of a hernial sac—no matter how satisfactory their condition may appear to be—should never be returned to the abdominal cavity without first drawing down a sufficient length of the ileum to ensure that retrograde strangulation is not present. In other words, a hernia should not be reduced until the conditions present have been very thoroughly understood and appreciated.

A rough sketch of the conditions present in this case is reproduced with this article.

AN UNUSUAL FOREIGN BODY IN THE PLEURAL CAVITY.

By A. G. PEREIRA, L.M.S.,

Assistant Surgeon, Municipal Hospital, Pollachi.

A SHEPHERD boy, Annchellam by name, set out one day to procure fodder for his sheep. He climbed a tree to the height of about 20 feet, and was plucking twigs with a billhook tied to a pole, when he fell and a broken end of a dried-up branch of the tree penetrated the left side of his chest a little below the armpit, fracturing and splintering the 3rd and 4th left ribs. He was lying unconscious when some passers-by picked him up and brought him to hospital the next morning after the accident, apparently some 16 hours after it had occurred. The sub-assistant surgeon who was on duty at the time cleaned up the wound and applied a dressing.

When I saw him the next morning, the dressing was soaked with foul-smelling pus; his temperature was 104°F., and respirations 80 per minute. Operation was carried out immediately. The splintered rib fragments were snipped off; a large drainage tube inserted, and retaining sutures put in.

After operation the patient's temperature dropped to 100°F., and for some days continued between 100° and 102°F., but his progress was unsatisfactory. Finally, on the 16th day after the accident, the pleural cavity was explored,

whereupon a fairly big, rough, loose body was felt inside the pleural cavity. He was now operated upon again, and an irregular splinter of wood measuring 2½" long by 1½" wide was removed from inside the chest.

Subsequent to this the patient's progress was uneventful. The pleural cavity was irrigated daily for some days with an iodine solution and afterwards with a perchloride lotion. He was discharged cured on the 17th day after the second operation.

A CASE OF MALIGNANT MALARIA.

By N. CHATTERJEE, M.B.,

Domjurh, Howrah District.

BIJUPENDRA NATH CHUKRAVARTI, a student, was suffering from fever, and I was called in to see him on the second day of illness. I found him with a temperature of 104.5°F., intense headache, pains all over the body, nausea and bilious vomiting, and constipation. A blood film was immediately taken—as the condition suggested malignant tertian malaria—quinine bihydrochloride gr. x. at once given by the mouth in solution, and symptomatic measures adopted for the fever. But I could find no malaria parasites in the films, and the total leucocyte count was 6,000 per c.mm.

The next day his condition was worse, with severe headache, marked tympanites, pulse 160 per minute, and respirations 45. The patient was delirious, and lumbar puncture was carried out; but examination of the fluid excluded cerebro-spinal meningitis. During the night, when I was again called in, the rectal temperature rose to 105°F., and the axillary to 103.5°F., the pulse being about 170 per minute, and the heart sounds almost inaudible.

On the next day, I explained the gravity of the situation to the patient's relatives, and despite my inability to find malaria parasites in the blood films taken, decided to treat the case as one of malignant malaria. Adrenalin, ⅓ c.c. of 1:1,000 solution was given hypodermically, and strophanthin, gr. 1/500th intravenously; and this was followed up by an intravenous injection of gr. 4½ of quinine hydrobromide in 20 c.c. of normal saline. The rectal temperature subsequently rose to 109°F. and the axillary to 107°, but the patient was treated with ice packs and iced saline per rectum continuously.

On the fifth day of illness the patient was definitely better, with an oral temperature of only 103.5°F., and conscious. I now found scanty ring forms of *Plasmodium falciparum* in blood films taken that morning. I therefore continued the administration of quinine intravenously, giving another gr. 4½ that morning. On the sixth day the patient was convalescent with a normal temperature, and on administration of quinine by the mouth made an uninterrupted recovery.

My reasons for reporting this case are as follows:—

(1) Many of my brother medical practitioners rely on the effect of three consecutive intramuscular injections of quinine, or of examination of a single blood film, to exclude the diagnosis of malaria. Neither method is infallible.

(2) The intravenous method of administration of quinine is the one which is most appropriate for these very severe and comatose cases. Adrenalin, given previously, wards off all dangers of cardiac failure.

(3) A negative blood finding in suspected cases of malignant tertian malaria is of no value; there are a number of such cases where, for some reason or another, parasites are not found in blood films from the peripheral blood-stream. In such cases the medical attendant should treat the patient as if he were suffering from malignant tertian malaria, whilst daily examination of blood films may finally prove the tentative diagnosis.

A CASE OF ANEURYSM OF THE COMMON CAROTID ARTERY AT AN EARLY AGE.

By P. A. G. MUDALIAR, L.M.P.,

Sub-Assistant Surgeon, Civil Hospital, Syriam.

A BURMAN aged 19 years was admitted to the Syriam Hospital on the 14th May, 1924, for the treatment of a swelling on the right side of the neck. It had commenced as a small swelling 5 months previously, gradually increasing to its present size, and during the last 15 days had been causing intolerable pain. He had sought admission as a last resort to have it opened, thinking it to be an abscess. The patient gave a history of a sore on the penis two years previously. There was no history of injury.

On examination there was a tumour on the right side of the neck about the size of a hen's egg just below the angle of the jaw. The swelling was tense and cystic and lay under cover of the sterno-mastoid muscle. The presence of well marked expansile pulsation over the whole tumour was sufficient for me to make a diagnosis of carotid aneurysm. The glands in the groin and the epitrochlear glands were large and shotty. Beyond a small scar on the penis, there were no signs of syphilis.

At operation the tumour was found to be a sacculated aneurysm, arising at the bifurcation of the right common carotid, the origin of both internal and external carotid arteries being involved. The tumour was pressing backwards against the transverse processes of the cervical vertebrae. The vessels were ligatured above and below, and the tumour removed by dissection. The wound healed by first intention and the patient was discharged free from pain.

This case would appear worthy of record on account of the early age at which the aneurysm occurred, and also on account of the shortness of

the period between the infection with syphilis and the development of the lesion.

I am indebted to Dr. R. H. Liscombe, M.B., B.S., D.P.H. (Lond.), Superintendent of the Syriam Hospital, for his kind permission in allowing me to publish this case.

DYSPHAGIA AS A COMPLICATION OF MALARIA.

By Capt. C. C. DAS GUPTA, M.B.,

*Chief Medical Officer, Gopalpur Tea Estate,
P. O. Gopalbagan, Jalpaiguri.*

MRS. H., Hindu female, aged 24 years, 2-para, suffered from incessant fever from the 13th August, 1927, and I was called in to see her on the 16th of that month as her temperature had risen to 105.6°F. that morning. I found her having a rigor and covered with a quilt.

I applied cold sponging to the head, calomel, an alkaline mixture, and quinine hydrobromide, gr. x in a mixture twice daily. She vomited throughout the night, but was much better on the 17th and 18th. On the 19th the temperature again rose to 103.4°F., with incessant vomiting the whole of that night. On the 20th she could not swallow at all. Severe spasm of the throat came on about every five minutes and would last for a few seconds. On arrival that evening I examined the mouth, pharynx and naso-pharynx most carefully, but could find no cause for the very distressing condition. The larynx was clear and she could speak normally. The temperature was 103.4°F. There was no swelling of the neck, but marked tenderness over the lower third of the outer border of the right sterno-mastoid muscle. The chest was clear. During the spasm of the throat she had to be raised in bed, and threw her arms round the attendant to support herself. She appeared to be half choked until the throat had been cleared by spitting. There was, however, no cyanosis.

I at once gave an injection of atropine sulphate, gr. 1/100th, applied hot fomentations and Antiphlogistine over the throat, and gave a gargle containing potassium chlorate and glycothymoline. The next day—21st—she was better, but still unable to swallow even fluids. I gave an injection of atropine, also one of digitalis, and one of quinine. For the throat condition a steam spray with carbolic acid and menthol in it was used, and adrenalin and cocaine in liquid paraffin. The fomentations and Antiphlogistine were continued; an enema given, and rectal feeding instituted.

On the morning of the 22nd the tenderness in the throat had disappeared, but the patient was still unable to swallow. At 4 p.m. the temperature rose to 100°F., and she fainted. When she came round she begged me to discontinue the rectal feeds, owing to their discomfort. At 5 p.m. she could sip water in teaspoonfuls, and that evening was able to take a cup of milk and weak tea. She now made an uneventful recovery.

The patient was an intelligent and well educated female, and, as far as I could make out, not of a neurotic temperament. She had complete dysphagia for three days. Atropine seemed to have been the most active agent in curing this condition, whilst quinine and soamin injections, cured the malaria. It would appear that the incessant vomiting associated with the fever had produced either inflammation or erosion in the œsophagus, leading to the œsophageal spasm and dysphagia.

A CASE OF SUBMAXILLARY CALCULUS.

By M. UMAR,

Offg. Civil Surgeon, Bijnor.

RAM SAROOP, a middle aged patient, came to this hospital and was admitted on the 9th of March, 1927. The submaxillary region of the left side was swollen. In the centre of the swelling was a small ulceration, with pus exuding from it. I probed this and found a hard substance, so naturally concluded that the mandible of that side was necrosed.

I enlarged the wound and put my finger into it, and to my astonishment found a round flat stone, weighing 120 grains, embedded in the substance of the submaxillary gland, oval in shape, with a smooth notch near one pole.

After removal of the calculus the patient made an uneventful recovery and was discharged from hospital cured. I considered removal of the gland unnecessary.

A CASE OF UNUSUAL FOREIGN BODY IN THE ŒSOPHAGUS.

By BABU PRASAD GUPTA, L.M.P.,

Medical Officer, Mallawan Dispensary, Hardoi District.

THE following case of a very unusual foreign body in the œsophagus may be of interest to readers of the *Gazette*.

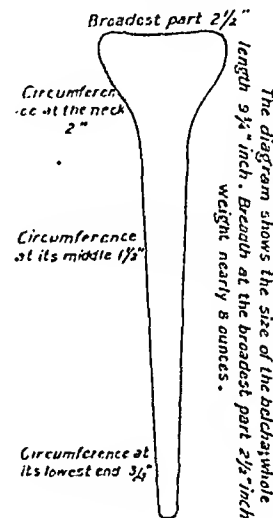
A fairly well built man aged about 45 years was brought to this dispensary with the history that a *belcha*—(a small mattock or trowel used for digging and up-rooting weeds)—had lodged in his throat. He complained of severe pain in the gullet, could only speak with great difficulty, and could swallow nothing at all. His attendants said that at first the *belcha* was visible from the mouth, but all efforts to extract it had only succeeded in pushing it down further until it had become invisible.

Nothing could be seen or felt through the mouth, but a hard projection could be felt in the neck on the left side. Every effort to extract the implement via the mouth failed. As the

patient was showing signs of impeded respiration, and œdema of the glottis threatened, I put him under chloroform and made an incision about $3\frac{1}{2}$ inches long along the anterior border of the left sterno-mastoid. Having dissected down until I reached the œsophagus, I now tried to push the *belcha* upwards, and to extract it through the mouth with a long forceps, but on account of its tapering upper edge it slipped every time.

I then opened the œsophagus through an incision about $1\frac{1}{2}$ inches long and tried to extract the *belcha* through the wound, but as it was $9\frac{3}{4}$ inches long and $2\frac{1}{2}$ inches broad I was unable to extract it by this route.

Finally, with one finger resting on the *belcha* just above the neck, and the thumb on the opposite side of the neck, I succeeded in gradually dislodging it upwards. Working it steadily and



gradually upwards I finally succeeded in making it visible in the pharynx, but again failed to extract it with forceps. I then inserted two fingers into the mouth and with great difficulty grasped the presenting part of the *belcha* with them through the mouth and finally extracted it. The incision into the œsophagus and the external wound were then sutured.

The wound healed by first intention, and the patient was discharged cured on the ninth day. The *belcha*, on being weighed, was found to weigh 8 ozs.

Whilst he was in hospital, the patient appeared to be sane, and on being asked how he came to pass so fearsome an object into his œsophagus stated that he did so to relieve a tickling sensation in it. Later, however, his relatives mentioned to me that he was subject to recurrent fits of insanity, and it would appear that he must have been in one of these fits at the time when he introduced the *belcha*.

I am indebted to Dr. Gouri Nath, Civil Surgeon, Hardoi, for permission to publish these notes, and to Dr. A. N. Mukerjee, in charge of the Sadr Hospital, Hardoi, for valuable suggestions with regard to their preparation.

Indian Medical Gazette.

JANUARY.

PUBLIC HEALTH IN ENGLAND.

THE annual reports of Sir George Newman are always crammed with valuable information which is communicated in forceful and attractive language. There are statistics in plenty in this report for 1926, but they are not allowed to remain as dry bones; they serve as a foundation for a living structure with active muscles, good red blood, and expressive features. Some of the more interesting statistical points are—

1. The influence of the Great War on the population. In 1911 males between 20 and 40 formed 15.58 per cent of the population. In 1921, they were only 14.1 per cent.

In Germany the corresponding figures were—15.1 per cent in 1910 and 13.7 per cent in 1919. The proportion of children under five years of age fell in England from 10.7 to 8.8, while in Germany the fall was much greater, viz., 12.0 to 6.3. From this it appears that while both England and Germany lost about 9 per cent of their males of fighting age, England lost 18 per cent of the children under 5 as a result of the war, and Germany nearly 50 per cent.

The birth rate of England continues to fall: it was 17.8 per 1,000 in 1926; the death rate was also low being 11.6 per mille. During the ten years period 1871—80 the birth rate was 35.4 per mille and the death rate 21.4, so that both have fallen approximately by one half during 50 years.

The chief causes of death were, diseases of the heart and circulation 188 per mille of deaths, pneumonia and other respiratory infection 150, malignant disease 117, diseases of the nervous system 103, tuberculosis 82, old age 54, and violence 41.

The infant mortality was only 70 per mille and the death rate for children aged one to five years was correspondingly low. It is interesting to note the decline in the mortality from the chief infectious disease between 1871—80 in 1926.

Enteric Fever	..	0.32 per mille to 0.009
Tuberculosis of the lung	..	2.13 to 0.771
Whooping cough	..	0.51 to 0.115
Measles	..	0.38 to 0.089
Scarlet fever	..	0.72 to 0.017
Diphtheria	..	0.12 to 0.077

It is rather surprising that diphtheria should show a smaller drop in mortality than any of the other fatal infections in spite of the discovery of a specific treatment for that disease. It is obvious that enteric fever and scarlet fever have ceased to exercise any important influence on the

death rate, while tuberculosis and other infections can also be classed among the "disappearing" diseases." Cancer, heart diseases, and respiratory infections show no signs of yielding to the preventive measures which have hitherto been adopted, and it is clear that the next great forward movement must be concentrated on these.

Sir George Newman is far from satisfied with the existing procedure of death registration; in many cases the statistics are useless or even misleading; for example the deaths from motor accidents are not classified in such a way as to show how many drivers, passengers and pedestrians respectively are killed. In the deaths from cancer a large number of deaths are returned as being due to cancer of the liver and gall-bladder, whereas there is reason to believe that the primary seat of the disease was usually in some other organ. Many women who were known to have had cancer of the breast were shown as having died of some other disease and no reference was made to the existence of cancer which must often have been an important factor in connection with death.

In 1924 only 124 deaths were returned as due to alcoholism: it is quite clear that this figure is far from giving a true picture of the influence of alcohol on the death rate.

Sir George makes a reasoned attack on the use of the term "status lymphaticus" as a cause of death; he shows clearly that the leading text books are quite misleading in their teaching on this subject. There is no clear evidence that an association exists between the size of the thymus gland and the liability to death from trivial causes. There is a constitutional condition in which death may occur from slight causes, but the use of the name "status lymphaticus" is mischievous as it suggests that a precise knowledge exists whereas we are completely ignorant of the real nature of the condition.

The use of the medical jargon, especially in connection with endocrinology has a most pernicious effect on the mental outlook of the medical man. It lulls him into a false sense of possession of scientific knowledge; instead of seeking for the true facts he repeats a high-sounding formula. The notification of infectious diseases often fails to achieve its real object which is to give early information which will help in controlling the spread of infection. The chief obstacle in this connection is the difficulty in recognising certain diseases such as lethargic encephalitis and cerebro-spinal fever; many slight cases of these diseases must be missed. More than 10,000 cases of small-pox occurred during 1926, but there were only 15 deaths. Only half of the infants in England are being vaccinated so that there is a prospect of a steady increase in small-pox. If the disease should continue to be of an extraordinarily mild type this increase will only involve a great deal of expense and worry, but if the virulent form should make its

appearance there will be a rude awakening from the existing feeling of indifference which exists.

The British Parliament in its wisdom has decreed that exemption can be claimed from vaccination, and thus is carrying out a very interesting if somewhat risky experiment in epidemiology.

In Detroit from 1915 to 1923, there were 4,631 cases of small-pox with 17 deaths, but in 1924, there were 1,610 cases with 163 deaths including 124 cases of the hæmorrhagic type. This experience shows that virulent small-pox may appear without warning in places where the mild type had prevailed for several years.

Scarlet fever continues to be of an extremely mild type: two outbreaks were traced to the contamination of a milk supply by an unsuspected carrier of infection. The use of the Schick test and of protective inoculation against diphtheria is gradually extending in England but the country as a whole cannot be said to have attained to a satisfactory degree of control of this disease. The fall in the mortality from 10.3 per cent in 1911 to 5.9 per cent in 1926, may be due in part to the diagnosis of mild cases on bacteriological grounds: it is suspected that some of the "positive" cases are mere carriers of the bacillus who are suffering from some other throat infection, whereas formerly only clinical positives were included as diphtheria.

Influenza became exceptionally prevalent early in 1927. Protective inoculation was of doubtful value in preventing attacks, but the inoculated suffered much less from pneumonia and bronchitis than the unprotected; deaths were chiefly in the very young and very old, in striking contrast to the great pandemic of 1918 and 1919, in which young adults suffered severely. Nothing important was discovered with regard to the bacteriology of influenza except that in a carefully controlled small group of people there was a sharp rise in the frequency of healthy pneumococcus carriers just before the disease appeared: there was also an increase in the percentage of carriers of the Pfeiffer bacillus, but this was not so sharp and it occurred rather later than the rise in the pneumococcus carriers.

Encephalitis lethargica comes in for special notice; the number of cases notified in 1926 was less than half that of 1924, but it would be premature to assume that the disease will continue to decline. Many cases are mild and atypical so that diagnosis is often impossible. There is a very valuable report of a study of the disease by Dr. MacNalty and Dr. Ashton in which the various types of the disease are described. The initial symptoms are often those of headache and pyrexia, sometimes with slight catarrh, so that influenza is frequently diagnosed. Drowsiness may be the first symptom, diplopia at the onset was common and was an important diagnostic feature; hiccup, speech changes and severe conjunctivitis were important initial symptoms. There was drowsiness

during the illness in two-thirds of the cases. Carriers, acute cases and unsuspected cases are regarded as possible sources of infection. Chronic carriers are believed to occur, though exceptionally. Acute poliomyelitis was very prevalent in 1926. An excellent account of the chief features of the disease is given in the report and it is interesting to find that the first account of the disease was written by Dr. Michael Underwood, an English physician, in 1784. The disease became epidemic in England in July 1926 and continued to be prevalent till February 1927. It was most common in some of the South Eastern countries and in the Midlands; there were few cases in London. Though it was often difficult to detect the direct path of infection from person to person it appeared probable that such communication was the rule, either by convalescent cases, healthy carriers or actual cases, including mild unrecognised forms of the disease. Adults were sometimes attacked, though the vast majority of the cases were in children under 15 years of age. The path of entry of infection is believed to be by the upper respiratory tract, presumably by droplet infection. The disease at the onset is an acute febrile infection, often with catarrhal manifestations suggesting influenza; next come pains in the back and limbs, drowsiness or even stupor, and stiffness of the neck muscles. At this stage the cerebrospinal fluid becomes altered: it escapes under pressure and shows a high white cell count, first polymorphonuclear then small mononuclear. Next come the various paralytic phenomena which may be due to affection of regions of the spinal cord, bulb, cerebral cortex, cerebellum, or peripheral nerves. The commonest form is the well known spinal form with paralysis of certain groups of muscles.

The account of the disease contained in the report ought to be read by all who wish to know the variations of this very protean and puzzling malady. Isolation of all patients, including those who are merely under suspicion, appears to be the best means of dealing with the disease. Cancer is slowly increasing in prevalence, but not to such an extent as to prove that the disease is really becoming a greater menace than formerly. Better diagnosis and the increasing longevity of the people of England amply account for the increase in the total number of cases.

It is quite obvious on the other hand that there has been no appreciable practical result from the great efforts which are being made to solve the cancer problem. The Cancer Committee of which Sir George Newman is chairman is exploring every likely avenue of attack on the stronghold of cancer; very valuable work has been done, but the writer of this review has always been of opinion that the most promising line of work is to argue from the known to the partly known, and if this process should yield good results to go on to argue from the newly

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solved to the still unsolved parts of the problem. We do know how to prevent the *kangri*-burn cancer of Kashmir, radiographer's cancer and various other forms of the disease in which a known irritant is an essential factor. There are other forms of the disease in which a partly understood form of irritation is likely to be a factor of great importance. If these forms, such as cancer of the penis and stomach can be controlled by the removal of the most probable sources of irritation, there will be good grounds for applying the same principles to the remaining forms of cancer, especially as most of them are known to occur at sites where irritation is very likely to occur.

We make no apology for returning again to this subject: its importance is sufficient to justify the most persistent advocacy of a procedure which appears to us to hold out the promise of a considerable measure of success.

Tuberculosis.—This is a disappearing disease in England. In spite of the increase which took place in tuberculosis of the lung during the war the deaths have fallen from 38,422 in 1911 to 30,108 in 1926; the deaths from other forms of tuberculosis have fallen from 14,698 to 7,417.

The decline in the disease is probably due to an increase in the resisting powers of the population rather than to the special measures of control which have been adopted. In 1918 the deaths from tuberculosis of the lung increased to 45,338 from 36,203 in 1913 so that food supply appears to play a very important part. The various local tuberculosis schemes have been shown to produce excellent results and when these are extended all over the country they will doubtless do much to hasten the diminution of the disease.

Village settlements and occupation colonies have been shown to form a solution of the difficult problem of dealing with the patients who have improved by sanatorium and hospital treatment. Sanocrysin treatment has been tested and found to be of value only in certain selected cases. The Spahlinger treatment is regarded as being worthy of further trial under scientific control, but unfortunately Dr. Spahlinger has refused to supply the necessary materials for the requisite tests.

Calmette's immunization method is being investigated under conditions approved of by Calmette himself, it is regarded as being *sub judice* as yet.

Organised treatment centres for venereal disease are doing excellent work; not only do they yield important results in themselves, they also serve to raise the standards of treatment by private practitioners, who will otherwise find themselves at a disadvantage if their treatment is found to be inefficient when compared with that which is available at the centres.

Syphilis may well be found to be capable of control within the next few years, gonorrhoea will

follow, but more slowly as there is no really specific treatment for this disease.

Maternal mortality remains almost stationary, but the measures which are being adopted by the Ministry of Health are bound to produce an improvement when they are more widely and strictly enforced.

Maternity and child welfare institutions are increasing in numbers and efficiency, and the important problem of the "pre-school child" is being tackled with energy.

The Insurance Medical Service has passed through its difficult and critical early stage; no less than 13,649,597 insured persons are attended by practitioners on the lists of the Ministry and a sum of £8,621,638 is spent on medical benefits. Disciplinary action is taken in all cases in which complaints are received against insurance practitioners: grants are withheld in cases of proved default, but the number of cases of a serious nature is surprisingly small. Various minor problems still arise in connection with the insurance scheme, such as the question of economy in prescribing.

Health education is actively promoted by a number of the Insurance Committees, but the absence of a specific allotment of funds for propaganda work had been an adverse factor; some committees have found the necessary funds, others prefer to devote all their income to medical relief.

The chapter on nutrition is a most valuable contribution to an important subject; it is singularly free from faddism and deals in a sane and rational manner with the food problem.

Milk is shown to be a most valuable food in early life, and the average daily consumption of half a pint daily is regarded as quite inadequate. Milk control is one of the most important functions of the Ministry of Health; it is becoming more and more effective from year to year.

Adulteration of milk and other foodstuffs has declined in a remarkable manner since 1880.

Food poisoning has always been a subject of concern to the Ministry though the actual deaths from this cause are relatively few. Several outbreaks have been found to be due to infection by dysentery bacilli of the Flexner or Sonne groups.

In one outbreak typical canned meat poisoning occurred simultaneously with paratyphoid B. infection: the person who handled the toxic canned beef was a paratyphoid carrier; she ate some of the beef and had diarrhoea; apparently she then infected the toxic beef with paratyphoid organisms in the course of handling it: some of her customers had food poisoning, others had paratyphoid fever. The Aertycke bacillus was responsible for outbreaks of ham, bacon, brawn and egg-poisoning.

Artificial light treatment is discussed and the opinion is expressed that the carbon arc light is the most valuable source of light. The mercury vapour tungsten arc lamps have a rapid and active action, but they are believed to be of low

penetrative power and they have the disadvantage of falling off rapidly in power after prolonged use. The necessity for skilled control in the employment of artificial light treatment is emphasized: positive harm has resulted not infrequently from its use.

Under conditions of strict control ultra-violet light does not yield the striking results which have been claimed for it by some enthusiasts.

Deaths from anaesthetics were 556 in 1926, as compared with 276 in 1911, but the great increase in the number of surgical operations fully accounts for the larger numbers. An added difficulty is that it is not easy to separate the genuine anaesthesia fatalities from those due to operative shock and other conditions.

The Ministry of Health carried out a large number of investigations of disease, including several international enquiries.

The spirit which imbues Sir George Newman is well expressed in the following words:—

"The progress of a nation's health is a secular movement.*.*.* As it must inevitably be the primary so it is perhaps also the most absorbing, alluring and irresistible of all the active forms of human effort. For here we are dealing with the proposition of remaining alive in the world, of enlarging the content of life, of increasing its capacity, of making it longer, happier and more constructive for all men. Can any enterprise be greater? We, who are the medical or administrative servants of this undertaking, must not allow ourselves to become customary or routine in thought, action or outlook. The efficient medical officer of a Local Authority needs, of course, professional competence and good judgment, but he should also have a thirst for knowledge, foresight, a sound historical sense and high purpose. Without these characteristics he is scarcely earning his public pay."

The paragraphs of the report which deal with the function of the State in stemming disease constitute a weighty pronouncement which ought to be read and meditated on by every one who is interested in the welfare of the people of India. It shows what has been done in England by State intervention to combat disease and death. The methods which have had such a measure of success in that country may not be suitable for employment in India but the great underlying principles are the same for all countries. For this reason we have taken the liberty to quote paragraphs 342 to 345 of Sir George Newman's report for 1926, verbatim below.

In expressing a general opinion on this report "On the State of Public Health," it is difficult to avoid the use of language which would suggest exaggeration or fulsome praise.

If the existence of such a suspicion should induce our readers to read the report and judge for themselves we feel that two happy results will be achieved, the reader will derive immense benefit and we shall be absolved from the charge of

unreasoning enthusiasm. Those who read the report must congratulate Sir George Newman on his good fortune in having found so congenial an occupation, and England on having found the ideal medical administrator.

J. W. D. M.

A SNAKE-BITE POSTER.

THERE has long been needed a really authoritative and reliable snake-bite poster for use in hospitals, dispensaries, and public institutions in India. At the suggestion of Messrs. Thacker, Spink and Co., a large coloured snake-bite poster, $3\frac{1}{2}$ by $2\frac{1}{2}$ feet in size, has now been prepared at the Calcutta School of Tropical Medicine; to be issued as a supplement on payment to subscribers to the *Indian Medical Gazette*. It is illustrated with 14 illustrations, mostly in colour; and every attempt has been made to reproduce the exact natural colouring of the species concerned.

The letterpress of the poster deals, first with the distinction between colubines and vipers; secondly, with the points of identification of the really important poisonous snakes of India, viz., the cobra, king cobra, banded krait, common krait, the coral snakes, Russell's viper, the *Echis carinatus* or *phoorsa*, and the pit vipers. This part is very fully illustrated, the illustrations being taken from Fayrer's famous *Thanatophidia of India*, Colonel Wall's publications, and Colonel Acton's article on poisonous snakes in Byam and Archibald's *Practice of Medicine in the Tropics*; as well as from mounted specimens of the snakes concerned. The third section gives instructions for the treatment of snake-bite, and is mainly based on the work of Acton and Knowles on the subject in the *Indian Journal of Medical Research* for 1914-15.

The poster will be supplied to subscribers to the *Indian Medical Gazette*—(one copy only to each subscriber)—on application to Messrs. Thacker, Spink and Co., P. O. Box No. 54, Calcutta, at the following terms:—

Unmounted, on paper, (including packing and postage), Rs. 2.

Mounted on linen, and with rollers, ready to hang on the wall, (including packing and postage), Rs. 7-8. Copies are now available.

WHAT THE STATE IS DOING TO STEM DISEASE.

An Extract from the Report by Sir George Newman on the state of Public Health of England for 1926.

"342. The problem then is to prolong man's days by reducing premature mortality, to remove the causes of disease and physical disharmony and their results and to enhance the physical and mental capacity of all classes of the nation. It is a large proposition. A moment's consideration will show that many different factors and agencies, social as well as medical, will play an essential part in this vast enterprise. There is hardly a central department of the State

which will not, consciously or unconsciously, make a contribution to the condition of the public health; there is no branch of the service of the Local Authority which will not, directly or indirectly, play its share. The social, political and economic life of the people, their wages and labour, their habits, customs and circumstances, their educational equipment, will all conduce, or be antagonistic, to their physical welfare. The issue is something infinitely wider than the science and art of Medicine, yet that science and art is the focal point.

343. There are, however, three great spheres of Public Medicine which fall within the province of the State. First, there is the medical profession; secondly, there is a sanitary environment and sanitary institutions; and thirdly, there are the public medical services. In a general way it may be said that the Ministry of Health is concerned with all these matters. In this country medical education is provided under the Universities upon the advice of the General Medical Council under the Medical Acts, and within the last half-century the State has imposed upon the profession an ever-increasing series of statutory duties which form in some ways the foundation of the State's defences against disease. More than that, the State has invited the medical practitioner into the service of the community, providing appropriate safeguards for the protection of his individual privileges and rights as a member of a learned profession having a particularly intimate relation to the sick person. This formal association of the doctor with the State began under Act of Parliament nearly a century ago in the establishment of the poor law medical service, which in due time gave birth to the public health service, which in its turn comprised public medical services for the mother and her infant and for the school child. In more recent years there was organised by the State the health insurance service and national medical research. In other words, the State has designed machinery providing facilities by which the medical man, if he so wishes, may serve the State in various capacities—in the medical service of the sick poor, the mother, the infant, the school child, the factory worker, the insured person, the mentally deranged, the physically defective, as well as in what is known as "the public health service." Even medical education and medical research are now subsidised by the State. It is obvious that there is no central department more concerned in these developments than the Ministry of Health, because it is impossible for Parliament to devise adequate health arrangements for a nation without a well-equipped and sufficient medical profession. In the evolution of State Medicine we have come to a stage of partnership between the State and the medical profession, and between all branches of that profession, in the behalf of the people as a whole.

344. Long before our own times the State had called upon Local Authorities, particularly the City of London, to concern themselves with the sanitation of the area for the governance of which they were elected to be responsible. It is now common knowledge that Local Authorities have had imposed upon them by Parliament a large number of statutory duties in respect of sanitation, nuisances, water-supply, food control, river pollution, housing, infectious disease, hospital accommodation, and so forth. These matters form the solid foundation of all enduring public health work. It must never be forgotten that a sanitary environment is the essential basis of all effective medical services. For the purpose of such services is to make medical facilities available to the individual, yet they can as a rule be neither available or effective in insanitary circumstances. Now what is the form of existing health services and what is their answer to the problems of disease with which we are faced? I think it may be set out concisely as follows:—

(a) First, there is *ascertainment* of the situation—notification of births, the certification of sickness, the notification of infectious disease, the registration of deaths, the account-keeping of the physical condition and progress of the English people. The public is deeply concerned in this verification and should do all they can to assist. Records must not be overdone, but they must after all be adequate and correct. It is as futile to complain of the collection of vital statistics as it would be for a business man to complain of accounts of income and expenditure or of profit and loss.

(b) Secondly, *there is maternity and infant welfare*. A nation that fails to safeguard maternity and conserve its infant life would be adjudged to be neglectful of its source, a very wasteful and far-reaching degree of neglect.

(c) The *School Medical Service* is another means of finding out whether anything is physically or mentally wrong with the rising generation and providing a timely remedy. With maternity and the care of the infant it lies at the foundation of all solid building and good construction work. Both movements have abundantly justified themselves, though neither lacks helpful critics.

(d) A fourth means invented by the State and the people thinking together—and as a living statesman said "the people is the State and the State is the people"—is the *National Health Insurance Act*. The State, in fact, is the people organised for governance and by the terms of this Act the majority of the workers have been insured against sickness, and have now available a medical service of growing importance and utility. The history of its development will be referred to below.

(e) Older than any of these is the *Poor Law Medical Service*, which sprang out of the reorganisation of the Elizabethan Poor Law in 1834 and which deals with the substantial group of the population who are necessitous and cannot even find the wherewithal for sharing in an insurance system.

(f) At the time of the beginning of the Industrial Revolution at the end of the eighteenth century, there arose a voluntary movement, originated by public-spirited medical men, which sought to protect the factory worker from the risks of his employment. As has happened all through our history, the State in due course adopted the ideas of the more enlightened employers, and devised what we know as the *Factory Acts*, which, though administered under the Home Office, are first cousins of the Public Health Acts, the administration of which is supervised by the Ministry of Health, and they must take their place in this category.

(g) Lastly, in recent years Parliament has found it necessary to establish a series of special means for a direct attack upon some of the more insidious and incapacitating maladies, such as small-pox and other infectious diseases, lunacy and mental deficiency, tuberculosis, venereal disease, ophthalmia of the newborn, blindness, and dental decay. We have indeed also the beginnings of a direct attack upon cancer, rheumatism, and the epidemic nervous disorders.

These seven "public medical services" illustrate the form in which the science and art of Preventive Medicine has been expressing itself during the last generation. They are the superstructure standing upon the foundations of sanitation, food control and improved environment. What has been their answer? I avow my belief that they have changed the face of England. Even more than that, with all their limitations and imperfections, they have, though so often criticised at home, been copied all over the world. We are a nation which flourishes on criticism; it is our incentive to improvement. The improvement and perfection of these three implements of Public Medicine—a competent medical profession, a sanitary environment, and economic and effective public medical services—is, as I have said, a matter of time and

vigilance, of steady growth and wise amendment. In them we are building for generations to come. But of their early results we have evidence which cannot be gainsaid.

345. The evidence is so manifold and varied, it is so personal and local, so largely economic and social, that a volume would be necessary to present it. But a key is at hand in the story of mortality as set out in the annual returns of the Registrar General. We must take a long measuring rod and go back 80 years; we must avoid the fallacies which arise by comprising one year too closely with another; and bearing these two points in mind, we may study, and reflect upon, these extracts from the ledger of a nation. The declaration is so simple and obvious that he who runs may read.

that it is impossible to hold the Medical and Veterinary Section of the Congress in 1928, and it has been abandoned. This, however, will not affect the general meeting of the Congress, which will be held as usual.

The annual Indian Science Congress in 1929, will be held in Madras. By January 1929, a sufficient interval of time will have elapsed after the Congress of the Far Eastern Association of Tropical Medicine to allow of the accumulation of papers of sufficient merit; and it is hoped that the meeting of the Medical and Veterinary Section of the 1929 Scientific Congress may be a

England and Wales—Annual Standardised Death Rates.

Death Rates at Five groups of Ages, and Infant Mortality at certain periods.

Period.	DEATHS OF PERSONS PER 1,000 LIVING AT SUB-JOINED AGES.						Deaths of Infants under one year of age per 1,000 births.
	All Ages (Standardised.)*	0	5	15	25	65 and upwards.	
1845—50 ..	22·4	68·7	7·6	8·7	15·9	97·1	15·7
1866—70 ..	21·2	68·1	6·0	7·1	15·4	91·3	15·7
1886—90 ..	18·5	56·9	3·9	4·7	13·8	91·5	14·5
1906—10 ..	14·4	41·7	2·7	3·2	10·7	81·9	11·7
1921—25 ..	10·9	24·7	2·1	2·9	8·8	76·0	7·6

* The death rates in this column are standardised to the sex and age constitution of the population enumerated in 1901.

These figures mean that in spite of an enormous increase of population without increase of home territory, the total death rate and the infant mortality rate of the nation have been halved inside four generations; that the mortality of childhood is one-third of what it was eighty years ago; and that the 'expectation' of life for a child born in this country to-day is not less than seventeen years longer than it was for a child born in 1846. This is the answer."

THE INDIAN SCIENCE CONGRESS, 1928.

We have been asked to announce that the Medical and Veterinary Section of the Indian Science Congress, 1928, will *not* be held. Owing to the fact that the biennial Congress of the Far Eastern Association of Tropical Medicine was held in Calcutta from December 5th to 10th, 1927, it was doubtful from the first whether there would be a sufficient number of members attending, or a sufficient number of papers presented for the Medical and Veterinary Section of the Indian Science Congress—to be held in Calcutta in January 1928—to warrant the holding of this section. Some 300 circular letters were sent out to those members of the medical and veterinary professions in India who usually attend or submit papers to the Indian Science Congress, and the replies were almost unanimously in the negative. Only eleven persons expressed their intention of being present, and only four members proposed to read papers.

Under these circumstances, the Executive Committee—wisely, in our opinion,—has decided

really representative and valuable one and a success. Those who intend to read papers or to be present at the 1929 Congress are invited to communicate with Lt.-Col. R. Knowles, I.M.S., Calcutta School of Tropical Medicine.

Current Topics.

Looking Backwards.

We have recently received, through the courtesy of Major J. C. John, I.M.S., Superintendent, Orissa Medical School, Cuttack, a most remarkable document. It is a *verbatim* copy of official instructions published in the year 1817 by the Medical Department (presumably of the East India Co.) of how to treat cases of cholera. It is one of much historical interest and value. The official instructions for the treatment of cholera in 1817 were as follows. Apparently 12 grains of calomel within two hours was a standard remedy.

Memorandum. Cholera Morbus.

The most alarming symptom in this disease is the sudden prostration of strength at the very commencement. The patient, while walking or engaged in his usual occupation without any previous warning symptom, falls down and is immediately seized with vomiting, at the same time that cold clammy sweat breaks out over his body. His pulse can scarcely be felt, and his debility is such that he is unable to move from the spot without support. In some cases the patient has died within half an hour of the first attack. But in general, where no remedies are used, it proves fatal in ten or twelve hours. During the latter part of this period especially, the patient, when sufficiently sensible to describe his own

sensations, complaints of a painful sense of weight and heat in his stomach and bowels, and his excretions prove sufficiently the vitiated nature of their contents. When the irritable state of the bowels has been checked in the first instance, and the debility in some degree removed, a relapse is frequently produced by loading the stomach with food, and this is generally very speedily fatal.

The indications of cure therefore seem to be:—

1st.—To support the patient's strength;

2nd.—To remove the irritability of the stomach and bowels, and thus prepare the way for medicines which are given;

3rd.—To expel their morbid secretion, and

4th.—To restore the healthy action of the stomach before calling its digestive powers into action.

To answer the first of these purposes, we have an excellent and ready resource in any of the common spirituous liquors, and in urgent cases spirits of hartshorn or ether may be had recourse to. The dose of these remedies must be regulated entirely by the state of the patient. In common cases a medicine glass full of brandy with an equal quantity of water will restore the patient so as to remove all immediate danger of sinking. In other cases the same quantity of brandy must be given undiluted, or one drachm of ether or two of spirits of hartshorn, in one ounce of water. The exhibition of these or similar stimulants not only restores a degree of animation to the patient, but procures for him some respite from vomiting. This will, however, except in very slight cases, soon recur unless opiates be given to prevent it. Fifteen drops of laudanum may be given in two tea-spoonfuls of water, and if this should have the effect of keeping off the vomiting for some minutes the same quantity may be repeated when it recurs. Should the vomiting come on immediately after taking the first dose, the second should be increased to 20 or 25 drops, and in similar circumstances, the third dose to 30 or 40 drops, and so on after each attack of vomiting.

Opium may likewise be applied externally to the stomach, moistened with water or spirits, from 5 to 10 grains, mixed with water and rubbed with the palm of the hand over the upper part of the belly is often sufficient to stop the vomiting. In many cases it will be desirable to combine the opiate with the stimulant and in slight cases the opiate is alone required.

By these means the irritability of the stomach will be speedily subdued, and it will be brought to a fit state to retain the purgative medicines that are to be given with a view to expelling the morbid secretions of the intestine, calomel readily suggests itself as an appropriate remedy where the action of the liver is more particularly disordered. Care must be taken, however, not to give a large dose at once, which would infallibly bring back the vomiting. One pill of 3 grains may be given at first, and at intervals of half an hour or forty minutes each, two more. Should these not produce the desired effect in five or six hours, recourse must be had to a solution of an ounce of Epsom salts in ten or twelve ounces of senna infusion. Of this a Madeira glassful may be given every ten minutes while necessary. Compound aloetic pill may be combined with the calomel with great advantage; the quantities of each in one pill being two grains of calomel to three of aloetic pill. During the exhibition and operation of these purgatives the patient's strength should be constantly attended to, and when necessary supported by small quantities of hot brandy and water, given from time to time. An ounce of infusion of cherata taken twice a day, for three or four days, after the first attack will restore the stomach to its natural tone, or small doses of rhubarb of 5 or 6 grains each may be given evening and morning.

Cohimbo root in powder is also an excellent medicine in this stage of the disease. For some days after an attack of this disease the patient should avoid exposure to heat and should abstain from all heating and greasy food, and confine his regimen to the plainest and most simple diet. Further it will be proper to guard against a rule of practice which is not applicable to the form in which cholera morbus is at present most commonly

seen. The rule alluded to is that of administering diluents such as warm water, weak gruel in order to wash out the contents of the stomach before any medicine is given. When the progress of the disease to its termination in death is so rapid, as in many instances that have recently appeared, nothing can be more dangerous than any delay in supporting the patient's strength, and still more is that delay to be deprecated when the time is lost in the use of means that in the first instance increase the violence of the disease.

Medical Department.
The 13th September 1817.

Malaria and Tuberculosis.

By M. FREIMAN.

(*Journ. Trop. Med. and Hyg.*, July 1927, p. 181.)

FREIMAN gives his experiences in Cyprus and shows that in patients clinically free from signs of tuberculosis, the onset of malaria precipitates an acute tuberculous development, while recognisable consumptives with malarial infection have exacerbations, sometimes with a fatal termination. To explain the mutual influence of malaria on tuberculosis he made an examination of 406 cases of acute and chronic malaria by the Von Pirquet reaction. He concludes that: (1) malaria transforms the positive cuti-reaction to negative; (2) the anergy (*i.e.*, negative cuti-reaction) in malaria is due to the malarial intoxication; (3) if malaria is treated, the anergy can persist from 20 to 200 days; (4) creating anergy, malaria deprives the organism of its tuberculous anti-bodies and exposes it to the outer and inner tuberculous infection.

Diathesis, or the Influence of Soil in the Causation and Treatment of Disease.

(*Glasgow Med. Journ.*, August, 1927.)

In a recent issue of the *Glasgow Medical Journal*, Ramsay makes some interesting observations on "diathesis"—the inherited tendency or proclivity to any particular disease. "The diagnosis," he says, "is often written on the countenance of the patient, if only the doctor had cultivated the kind of experience whereby he might have been able to recognise it"; and he openly deprecates the extent to which this important factor has been neglected nowadays as a result of the dominance of the laboratory in the realm of medicine. The "scientific methods" of the laboratories are tending to displace the art and science of medicine.

Ramsay considers in detail three distinct types of diathesis:—(1) the neurotic, (2) the arthritic, (3) the scrofulous.

1. *The neurotic diathesis.*—The neurotic patient is well known, and it is important to remember that his peculiar tendencies develop during the first five years of life. Of spare build, restless and unwearied, with a mind so active that it allows neither himself nor his immediate circle any repose; he feels pain very acutely, and, consequently, what may in reality be a very trifling ailment assumes to him very serious proportions when interpreted and exaggerated by his nervous disposition. His nerves, over-developed, tyrannise over his body, and his excellent memory makes him a terror to a youthful doctor, who is never allowed to forget anything he may have said to him. Full of fads, he has often real idiosyncrasies in regard to drugs, and is therefore a most difficult patient to treat, for every prescription, no matter how carefully considered by the doctor, is said to disagree, and will in all probability have to be discontinued. On each succeeding visit the patient will say he feels no better, and straightway without any evidence of emotion will repeat a tale of endless suffering. He is always on the outlook for an opportunity to prove the doctor wrong and himself right, and although he may be most punctilious in taking the medicines prescribed, has little belief in their power to do him any good.

2. *The arthritic diathesis.*—This diathesis is a well-marked and widely-spread type, and includes persons popularly called "gouty" or "rheumatic." It exists among all ranks of society, and is found at all ages, being more frequent among children than is generally supposed. Much useful information regarding it will be obtained by careful routine examination of the urine, which generally contains uric acid in excessive amount. The "cayenne pepper" deposit is in many instances noticed by the patients themselves, and in the case of children the mothers invariably draw attention to it. The other secretions of the body are hyperacid and very irritating. The acid perspiration renders the epithelium vulnerable, and consequently cutaneous eruptions are of frequent occurrence. The patients themselves are big and stout, with a florid complexion and a genial exuberant manner. As a rule, they are hearty eaters, and in their younger days their digestion was quite able to cope with the many demands made upon it. They are in the habit of boasting that they never require a doctor and never take medicine. As the years pass, however, they are not so sure about their health; they tend to suffer from acid dyspepsia or to be annoyed by eruptions on the skin—the one condition often alternating with the other. They find too as they get older that they must change their habits with regard both to food and to stimulants. They must eat less, be very careful in the use of alcohol, and substitute regular exercise for desultory attempts at exertion; otherwise they may be suddenly cut off by an attack of pneumonia or other acute disease, or they may be invalidated by a constant series of chronic degenerative ailments, which are likely to terminate fatally from renal cirrhosis or from cerebral hæmorrhage. That description corresponds in brief to what Laycock has called the sthenic or sanguine form of the arthritic diathesis; but an asthenic or melancholic modification is frequently seen. These patients have a great tendency to obesity, with poor muscular development, and are usually slow in their movements, and generally of a sluggish disposition. Their outlook on life is pessimistic, probably due to the fact that their power of digestion is quite unequal to the quantity and quality of the food they habitually consume.

3. *The scrofulous diathesis.*—The scrofulous diathesis is very common, and is for the most part met with in children under ten years of age. Some of those affected present the outward appearance of good health, but the majority, owing to defective assimilation, are either abnormally pale or unnaturally livid. They have too obviously inherited the miserable legacy of constitutional weakness, and the inherent vulnerability of their tissues has been intensified by improper dieting and by overcrowding in insanitary houses.

There are two distinct types of the scrofulous diathesis.

1. *The ugly type.*—It is easy to recognise these slow lethargic children by their pale skin, coarse features, snout-like mouth, and short neck, thickened by masses of enlarged suppurating glands.

2. *The attractive type.*—Is in marked contrast to the former. The children are quick and alert, both physically and mentally. As a rule they have regular features, with a delicate pink and white complexion, long silky eyelashes, and although the glands in the neck are usually enlarged they do not form the large suppurating masses so characteristic of the ugly form of scrofula.

In both types, but more particularly in type one, after the disease has existed for several weeks, the eyelids, nose, and upper lip become swollen, and an eczematous eruption appears on the face. The acid secretions excoriate the skin and frequently cause a fissure at the outer canthus. This causes great pain and bleeds freely whenever the lids are forcibly separated. It is by no means unusual for the conjunctivitis to alternate with suppurating of the middle ear, and with eczema of the hairy scalp or other parts of the body. In every case nutrition is seriously impaired, and the coated tongue studded with large red papillæ is evidence of the irritable condition of the mucous membrane of the whole intestinal tract. Sometimes there is constant craving for food, and invariably more is eaten than can be digested: fermentation results, the belly becomes distended, and

the alvine evacuations have an offensive smell and an abnormal appearance. The urine is scanty, high coloured, deposits urates, and often contains indican and traces of sugar. The skin is pale and rough, the flesh hangs loose, the hands and feet are usually cold, the head perspires freely, and the hair is infested with pediculi. If, after a time, the system becomes infected by tubercle bacilli the joints, both large and small, are frequently destroyed by tuberculous inflammation of their synovial membranes accompanied by caries and necrosis of the bones. Severe ectropion—causing hideous disfigurement—will arise if bone necrosis occur in the neighbourhood of the orbit, and indelible scars invariably result if there has been suppuration of lymphatic glands in the neck or elsewhere. The clinical picture is one of bovine tuberculosis, and in all probability infection has reached the patient through the alimentary tract.

(We would advise our readers to assimilate these remarks in conjunction with the article on "The Constitutional Factor in Disease," copious abstracts from which appeared in Current Topics in the August 1927, number of this journal.—Ed., I. M. G.)

The Scientific Study of Death.

We have received from Dr. Arthur MacDonald, The Congressional Apartments, 100E, Capitol Street, Washington, D.C., U. S. A., a scheme of very considerable interest, details of which we publish below. Dr. MacDonald claims—we believe rightly—that living mankind has not made a sufficient study of the dying state; and he considers that such a study would lead to the far more humane treatment of the condition of the dying. (As far as we know, this subject has been the subject of special study by only one author—William James, in his *Study of the Emotions*. As far as we can recollect from his book, he claims that the vast majority of dying persons are completely unconscious that the world has already passed them by; that their end is "as a dream.") But such speculations are subject to far more exact investigation than has previously been given to the subject, and Dr. MacDonald claims that this matter should be investigated.

The author himself is in many ways a remarkable man. Educated in America, Germany, and France, and at the chief medical schools in each of these countries, he is a member of Congress, and has tried to stimulate international interest in anthropological observations. Recently, at the age of 70, he had himself overhauled from A to Z by ten members of the staff of the Johns Hopkins University. Every physical system was tested, including fractional test meals, barium-x-ray studies of his intestinal tract, urine analysis, electric cariological studies, etc. He claims that the complete analysis so presented gives the complete picture of a more or less normal professional man of 70 years of age; and proposes, after his death, to present his body to the same University for *post-mortem* study in order to verify or refute the findings during old age. We regret very much that the complete analysis of the findings which he has sent us are too detailed for publication, as our space is very limited, but, at least, the idea is an excellent one.

A Systematic and Scientific Study of Death in Man.

By DR. ARTHUR MACDONALD,
Washington, D. C.

In order to encourage a systematic and scientific study of the dying time, I would suggest that Medical, Anthropological and Psychological Societies pass some such resolution as—

Resolved: That the———Society of the———, favours the scientific and systematic study of the physiology and psychology of death in man, and requests its members to make such studies in every case of death, when there is opportunity.

It is a curious fact that as yet there seems to have been no systematic and scientific study of human death. There have been more or less sporadic efforts to make such investigations in exceptional and interesting

pathological cases. But the regular order, so to speak, or the average manner of death is not known. Some of the main reasons for such study are:—

(1) To gain trustworthy and general knowledge of what most often takes place in the dying hour, including details.

(2) To learn the manner of death for different diseases and the percentage of those conscious and unconscious.

(3) To find in what percentage of cases there is severe pain, slight pain, and no pain, and nature of the pain.

(4) To note details in exceptional and special cases and the causes of these phenomena, and the length of dying time, and nature of pain, if any.

(5) To determine the characteristics and differences in dying between infants, children, adolescents, adults before middle life, during middle life, in old age, and from 80 to 100 years of age; including points under numbers 2, 3 and 4 for their ages.

(6) To present eventually a general picture of the dying time, based upon a sufficient number of observations, and with instruments of precision when possible.

(7) That, with such knowledge, the treatment of patients during the dying time may be more humane and delicately carried out.

(8) That in cases that are liable to be painful, proper precautions may be taken in advance, so that pain may be avoided or greatly lessened.

(9) That, finally, the knowledge of the dying time may be so increased, that physical death will cease to be feared or dreaded by all persons, since through such knowledge pain may be practically eliminated, and death may be made easy, gentle, and placid.

The British Social Hygiene Council.

GREAT progress in the means of combating venereal disease throughout the British Empire has been made during the past year, according to the official account of the meeting of the British Social Hygiene Council held in July 1927 at Carteret House, Carteret Street, London, S. W. 1.

A special effort was made as regards India, where it was found that in the various Provinces visited congenital syphilis was prevalent, and that the social conditions were such that venereal diseases were disseminated among adolescents as well as among adults.

Many recommendations were made, including the provision of increased hospital accommodation, of ante-natal beds and of post-natal care, while it was also urged that there should be improved training of medical men and improved treatment of venereal disease, and of a free bacteriological service.

From the purely educational standpoint emphasis was laid on the importance of biological teaching, while from the social standpoint it was recommended that full information should be given; that once public opinion had been aroused the commercial interests in prostitution should be penalised, and that cinema films unsuitable to India should be banned. The Central Government has been invited to provide—

(a) for the diagnosis and treatment of venereal disease, and for recreational facilities for the Mercantile Marine;

(b) to co-operate with the Provincial Governments in securing the services of a biologist and psychologist during the winter season of 1927-1928 to initiate the additional teaching of biology and social hygiene, and

(c) that with the help of the Government of India the British Social Hygiene Council through an India Advisory Committee should make themselves responsible for the Indianisation of the dramatic films for propaganda purposes.

In each of the Provinces visited, Bombay, Bengal, Burma, Madras; in the Indian States of Mysore and Baroda, and also the Island of Cyprus, Social Hygiene Councils affiliated to the British Social Hygiene Council have been established.

Similar progress was reported from other parts of the Empire, though the Council has to deplore that in Ceylon there is a local agitation to remove the salutary embargo that exists on unauthorised persons visiting ships in port.

During the past year many conferences have been held and others are in progress. Among the points raised are the necessity of technical education of medical men by experts, the combination for the purchase of drugs, the establishment of scholarships for the proper training of medical men, and the provision of decent shore sleeping accommodation and recreational facilities in colonial ports for the Mercantile Marine.

The Mercantile Marine has very greatly occupied the attention of the Council for the past year, and generally speaking the main objectives have been to provide proper facilities for treatment, and adequate recreation of all sorts. The representatives of many towns and organisations of many towns have been involved, and a number of committees established.

The whole issue of broadcasting has been raised, and while the general position is under consideration, talks on biology, and physiology have been given, respectively, by Professor Julian Huxley and Professor Winifred Cullis.

A Summer School in connection with the activities of the Council was held for the first time at Balliol College, Oxford, and a second Summer School was also held from August 3rd—9th, at Keble College, Oxford.

A new edition of the *Speakers' Handbook* is in course of preparation, and during the last spring a conference was held on the whole problem of solicitation. The problem of mental deficiency was also considered, and it is hoped the new amending bill will soon become law.

The Council has supported the proposal made by the Commonwealth Fund of America as to the establishment of a Child Guidance Clinic in England. It has also urged that the Medical Research Council should promote investigations that may lead to the discovery of an effective cure for gonorrhœa; the Research Council are naturally also deeply interested in the problem, and correspondence is proceeding between the Medical Advisory Board of the Council and the Medical Research Council.

Other matters that have occupied the attention of the Council have been congenital syphilis, the after-care of women and children suffering from venereal disease, and the development of the Medical Department, which has proved its usefulness by the large number of enquiries received, to which replies have been given, enquiries coming from all parts of the world.

The propaganda work of the Council has been as active as ever; the Council has participated in a large number of conferences, both at home and abroad. The cinemotor outfits alone have illustrated addresses at 525 meetings, at which the audiences amounted to 160,108; 410,110 pamphlets have been distributed. This does not include the remainder of the work of the branches or any meetings not illustrated by films.

The Use of the Sigmoidoscope in the Diagnosis of Dysentery : A Clinical Lecture.

By Dr. A. J. GREGG, M.A., M.D., M.Ch., D.T.M. & H.,
Late Medical Superintendent,
Hospital for Tropical Diseases, London.

(A lecture given before the meeting of the Post-graduate Hostel, Imperial Hostel, Russell Square, London, W. C. 1, in September, 1926.)

Scope of paper.—While sensible of the honour of opening the discussion to-night, I am much exercised in mind as to what exactly is required of one opening an informal discussion such as this.

Should one deal in detail with one aspect of the subject, or treat it more widely and superficially; or should one deliberately try to provoke controversy?

I feel that I had best deal with the use of the sigmoidoscope in tropical diseases, speaking then from some little experience, and leave it to others to touch on different aspects of instrumentation.

As for provoking discussion, I am without alternative, for I feel sure, and, indeed, hope, that my few remarks will be obliterated in an avalanche of criticism.

Initial work.—My first serious acquaintance with the use of the sigmoidoscope was made in the Hospital for Tropical Diseases, London, and I desire to record at once my gratitude to the Honorary Staff of that hospital for their encouragement, and for permission to examine their patients.

In conjunction with Dr. Manson-Bahr, I have published an analysis of my first hundred examinations, which even then gave convincing evidence of the value of such examinations in obtaining accurate diagnoses. Indeed, it was because I had become thoroughly bored, not to say dissatisfied with innumerable microscopic searches for *E. histolytica* in the stools of patients suffering from "dysentery" that I looked around for some quicker method of diagnosis.

Value of Sigmoidoscopy.—My argument ran thus:—There are many causes of "dysentery," if we connote by this term any condition of tenesmus with blood and mucus passed *per rectum*, and, apart from cultural methods, the microscope can detect the casual organism only when the stool happens to come from a patient suffering from amœbic dysentery. Even then, granting the requisite skill, there are many limitations, for the *E. histolytica* is not to be found at every examination, not even in acute cases, as witness one patient passing frequent stools, mainly consisting of blood and mucus, in which amœbæ were found on the twenty-fifth day only, and that despite more than one stool examination daily by a skilled protozoologist. Again, if *E. histolytica* can be found when voided *per vias naturales* along with the intestinal content, would they not be the more readily found in a scraping taken from an actual amœbic ulcer? Lastly, who would think of treating a sore throat without so much as glancing at it. And believe me, the lesions of the bowel are no more difficult of macroscopic diagnosis than are those of the throat.

Value of the Microscope.—Please understand, however, that in no way do I decri the value of the microscope in this connection. I point out merely its limitations, and emphasise that it should be used as an adjuvant, but not as a substitute, for the sigmoidoscope.

Technique.—Passing now to the technique adopted, I find the following method of preparation to be as useful as any.

About two o'clock on the afternoon preceding the examination, the patient takes half an ounce of castor oil; next morning a soap and water enema is given, and the patient is allowed a light breakfast. One hour before the examination, the patient is given fifteen minims of tincture of opium. If necessary, the examination can be made with the patient in bed in the lateral position, but I prefer to have the patient on the table in the lithotomy position, as this posture permits any fluid content of the bowel to collect in the sacral curve of the rectum; such fluid can then be emptied out or swabbed out through the sigmoidoscope. The lithotomy position, too, appears to me to give the operator greater comfort of movement.

In cases of active dysentery of a severe nature, it is impossible to get the bowel quite clear; fortunately, in these cases the lesions are numerous and often characteristic, so that a mere transitory glimpse of a portion of the bowel wall will suffice for a diagnosis.

When ulcers are seen, my usual practice is to scrape an ulcerated surface here and there by means of a wooden match held in a long forceps. Such scrapings, smeared on a slide and covered with a slip, will often be found to be swarming with actively motile *E. histolytica*, even though previous examinations of the stools have been negative.

Normal Examination.—Before mentioning pathological lesions, I would like to describe the examination and appearance of a normal bowel.

The sphincteric tone should be good, with brisk anal reflex. No actual spasm should be present, nor should the preliminary digital examination (which should never

be omitted) cause pain. The sigmoidoscope is lubricated and inserted gently with the obturator *in situ* until the sphincters have been passed, when the obturator is exchanged for the light. Under vision the instrument is then advanced gently with the least possible use of the bellows.

The operation causes discomfort, but pain should be felt only momentarily when too great tension is being placed on the bowel, or when further progress is arrested. I greatly prefer to do the examination without an anæsthetic, because any complaint of pain is either of diagnostic import, or indicative of a danger point in the manipulation: it is rarely indeed that an anæsthetic is indicated. The bowel wall should be in soft folds which should gently yield as the instrument is advanced in the direction of the lumen. The mucosa should resemble the inside of the cheeks in colour, but slightly less shiny, and the small blood vessels are most prominent. There should be no abrupt change in the mucosa, but on reaching the pelvic colon the wall appears more flexible and the folds smaller and more numerous. Elevating the nose of the sigmoidoscope over the brim of the true pelvis may cause discomfort, especially when there is a large prostate, or any inflammatory condition of the uterus or its adnexæ. In quite a number of patients, examination cannot be carried beyond this point without causing undue discomfort; this often obtains even when everything appears, and probably is, quite normal.

Pathological conditions.—Turning now to the pathological bowels, I may say that the patients whom I examined were nearly all admitted to the hospital as suffering from "dysentery," nor, until after my examination, did I attempt to squeeze out of their histories any refinement of diagnosis as to the type of dysentery or the causal organism. Thus I was enabled to examine the bowels with an unbiased mind. In the majority of patients the dysentery proved to have one of three origins, helminthic, amœbic, or bacillary.

Of the helminthic variety there were but few examples; I have encountered dysentery due to infection with *Schistosoma mansoni*, and with *Heterophyes heterophyes*, but not in numbers sufficient to warrant my doing more than mention them.

The amœbic and bacillary types of dysentery I have seen in some three or four hundred bowels, and consider that a correct diagnosis between these two types can, and should be made; sometimes with fair probability, oftentimes with certainty.

The Amœbic Bowel.—In amœbic dysentery there are frequently accompanying hæmorrhoids; the sphincters are normal; the rectum is thrown into voluminous folds so that the bowel appears redundant. These folds are soft and easily pushed aside without pain. The colour and sheen of the bowel is normal; the contents, if present, are ill-mixed mucus and blood. Scattered on the bowel wall are small, clean-cut, oval, or diamond shaped ulcers, which may be covered by a grey slough, or present raw surfaces, which will be seen to bleed freely if rasped by the sigmoidoscope.

Whether the condition be acute or chronic, the appearance is little changed, except that the ulcers are more numerous and the blood more plentiful in the acute phase. Note that instrumentation is usually painless, despite the ulceration. A bowel of similar appearance may be encountered, but without any ulcers; a close inspection, however, will detect brighter spots on the mucosa, the sites of healed ulcers: such is the bowel of cured or latent amœbic dysentery.

The Bacillary Bowel.—In contrast with this is the appearance of the bowel in bacillary dysentery, both acute and chronic.

In the acute stage the sphincter may be hyper- or hypo-tonic; the bowel is intensely hyperæmic, and instrumentation is painful. The bowel content is a uniform mixture of blood and mucus with which much pus may be incorporated. The surface of the mucosa is dull, and oedematous thickening takes up the folds of the gut, so that they become less apparent. There may be large irregular, ulcerated areas, but not uncommonly

the bowel presents a spongy uniform wall, which oozes blood all over on the slightest touch.

In the chronic form of bacillary dysentery, the perineal muscles are wasted, the sphincteric tone poor, and the anus wellnigh patulous. The gut walls are thickened and firm, the folds narrow and scanty. The surface is, in part, normal or anæmic, in part hyperæmic and glazed or granular in appearance. There may be small ridges or polypi of spongy, granular consistency—a form of unhealthy granulations. Freedom of movement of the bowel in the pelvis is diminished, and instrumentation is painful.

Such are the sigmoidoscopic findings in bowels typical of amœbic and bacillary dysentery, and while atypical and border line appearances exist, a little practice will frequently permit of discrimination.

When both diseases are present, I have found that the bacillary appearances predominate.

There is always the chance of scraping any ulcers seen, and so, perhaps, confirming by microscopical examination the macroscopic diagnosis.

Mistaken Diagnoses.—As already stated, I made no attempt to define the nature of the patient's "dysentery" prior to the examination, and it is astonishing how many errors in diagnoses were then disclosed; errors, too, which could not have been detected by use of the microscope alone. Thus, labelled "dysentery," rectal cancer of many months' standing is, unfortunately, not infrequently found in patients coming from the tropics. I have also met with tuberculous ulceration and syphilitic stricture, ulcerative and hæmorrhagic colitis, polypi, and, commonest of all, hæmorrhoids.

Most of these patients' complaints could have been diagnosed on sigmoidoscopic examination; many by the use of a proctoscope; not a few by a simple digital examination; yet not one of these procedures, apparently, had been even attempted.

Truly, from time to time these patients had experienced dysenteric symptoms, but what negligence, indeed what criminality, lay in medical contentment, for months on end, in that travesty of a diagnosis—"dysentery."

Psychic Factors in General Disease.

Jour. American Med. Assoc., Vol. 89, No. 13, September 1927.

At the annual session of the American Medical Association in Washington, the relation of the nervous system to the human organism was considered in the light of recently acquired knowledge. The nervous system is divided functionally into several levels. Of these, the vegetative apparatus is the oldest in development; the cerebral cortex, the most recent, and between the two in point of evolution are the various reflex centres. The whole is united by association paths. Accordingly "it is not difficult," says Hunt, "to understand why mental states associated with anxiety, fear, depression, despair and prolonged conflict should cause disorders in other portions of the nervous system controlling visceral and somatic functions." Heart disorders, Foster points out, are accompanied by psychic abnormalities of two main types. In one type, genuine disease of the heart or blood vessels appears first and genuine mental disease follows. In the other type, primary mental disease is followed by misinterpreted sensations referable to the heart. The mental disease produced by cardiovascular disorders may be pronounced psychosis or merely a change in personality evidenced by diffidence and lack of initiative. The patient of the other class, in whom the mental condition is primary, often is trying to escape from a situation or from a conviction that is intolerable. His subconscious mind perceives that sickness would relieve him of responsibility, and current interest in heart disease supplies the needed suggestion. He then seeks medical advice for a visceral disease of which he is not a victim, but from which he sincerely believes himself to be in

danger. A large proportion of the patients seen in the course of an internist's practice are of this class. McLester believes that "one-third of the patients who come to the consultant because of digestive complaints are of the psychoneurotic type." He is convinced, furthermore, that most of them are not the victims of fortuitous circumstances but are born neurasthenics. In this respect it is encouraging to recall, with Hunt, that the constitutional factor does not necessarily exclude the possibility of adjustment and that well chosen environmental factors may offset the handicap of faulty inheritance.

In addition to the psychoneuroses that are associated with cardiovascular and gastro-intestinal disorders, well recognized psychic upsets may accompany exophthalmic goitre, diabetes mellitus and diseases of the nose and throat. The underlying cause of psychic events in these three conditions may be toxic neuroses, but as yet they cannot be placed definitely in that class. Neilson suggests that the chronic character of diseases of the nose and throat may bring on "all sorts of emotional and psychic upsets, ranging from simple phobias to stark terror." Difficulties in diagnosis and treatment of these conditions are further disadvantages from a psychogenic standpoint.

This review of the possibilities of psychic disorders in general disease demonstrates the truth of Woodyatt's assertion that "the power of emotions to produce physical alterations of the body does not seem unreal." Recognition and treatment of visceral and somatic symptoms which spring from mental causes, therefore, fall well within the field of the general practitioner and of the internist.

The Treatment of Burns.

By ALEXANDER MACLENNAN, M.B., C.M.,

British Med. Journ., October 1st, 1927, p. 590.

At the meeting of the British Medical Association in Edinburgh in July, MacLennan read an interesting paper on the treatment of burns. The first essential is relief of pain, and the speaker drew attention to the employment of prolonged chloroform administration as a substitute for morphia. The composition of the first dressing is important: wax solutions sprayed on the burned areas, waxed paper and tissue paper soaked in carbolic oil are recommended; a warning is issued against the toxic effects of picric acid when applied to large superficial burns. Shock should be treated by morphia and small doses of alcohol by mouth: fluid should be freely administered. There are obvious difficulties in the way of applying antiseptics to burned areas: most satisfactory results in this connexion are obtained by the use of horse serum but it is expensive. Duodenal ulcer as a complication of extensive burns has never been encountered by MacLennan. The importance of surgical intervention to prevent extensive scarring is emphasised. Thiersch or Wolff grafts cannot be employed until sepsis has ended: the speaker claims good results for his "tunnel" method of grafting. Narrow grafts are embedded under the surface and their locality marked by laying alongside them suture threads. After allowing for their taking root, which occurs in about ten days, the covering surface is removed so as to expose the grafts completely. On account of the close resemblance of the granulation tissue developed to sarcomatous tissue in its destructive effects a thin epithelial covering is almost certain of being destroyed from time to time. This feature of constantly recurring ulceration must be familiar to all; hence a solid covering is essential if healing is to be permanent. Scarlet red as an aid to epithelialization is recommended and we are reminded that burns can be caused not only by heat but by cold, chemicals, ultraviolet rays in sunlight, radium and x-rays.

Enemas: Some of their Uses and Abuses.

By LOUIS J. HIRSCHMAN.

Journ. American Med. Assoc., Vol. 89, No. 13,
September 1927.

THE employment of enemas has been rather overdone in recent years, almost any and every condition being subject to this treatment. The use of the soap-suds enema is condemned: following its use the mucous membrane becomes red and angry-looking and a plain water or 1 per cent. sodium bicarbonate solution is preferable. The use of hard rubber or glass enema tips or of the rectal tube is unhesitatingly disapproved of: Hirschman has seen severe laceration following the employment of one or other of these. A soft rubber catheter (No. 20 to 24 French scale) is the instrument of choice.

The ordinary urinary catheter having a conical tip and its aperture or eye just behind this on the side of the catheter adapts itself readily to the curvature of the anorectal canal. When well lubricated it is introduced with great ease and comfort to the patient, even right after operation. The outer end of the catheter can be slipped over the ordinary enema tip, which forms an excellent connector to the rubber tube connected with the enema container.

The type of lubricant used is of some importance. A water-soluble lubricant made of gum tragacanth or Iceland moss is the best. If the patient is not to be operated on there is no objection to the use of petroleum.

A greasy substance, however, is injurious to rubber and also makes it a little more difficult to cleanse the part before an operation. The same applies to olive oil or other like substances. Glycerin should never be used if there is any reason to suspect any raw surfaces or irritations. Nor should soap-suds be used, for the reason mentioned.

The lateral, or Sim's, position is the most convenient one for both the nurse and the patient in the administration of enemas. In this position, the parts can be seen and the weight of all the abdominal viscera is away from the lower bowel, so that there is no obstruction to easy entrance of the enema. If the patient lies in the lithotomy position with the knees fixed there is a tendency to strain and resist the enema which is absent when it is administered in either lateral position.

The attempt to give a so-called "high" enema is a futile proceeding as the rubber tubes simply coil themselves up in the rectal ampulla, and moreover the use of opaque enemas in radiographic studies of the colon has conclusively shown us that a pint of fluid will pass from the anal canal to the cecum often in one minute. This is as high an enema as any one could desire.

If the feces have become hard or impacted, hydrogen peroxide in the proportion of one part to two or three of warm water will disintegrate practically any impaction. Peroxide enemas are far more efficacious for removing an impaction than oil, glycerin or oxgall.

The use of turpentine to stimulate the expulsion of flatus is unnecessarily severe on the patient. One can secure far better results from the gentle astringent and stimulating effect of a 6 per cent. solution of powdered alum.

The flushing of the colon with gallons of water, either plain or medicated, has been greatly overdone in recent years. This large quantity of water not only distends the bowel but causes hyperemia and also removes all the mucus, which is nature's normal intestinal lubricant.

The legitimate field for enemas, irrigations and flushings is in the treatment of bacterial and parasitic diseases, e.g., colitis, proctitis, amebic dysentery or hæmorrhagic disturbances due to diabetic causes.

In some cases of multiple colonic polyposis a 6 per cent. enema of salicylic acid has produced a tanning

effect on the pedicles of small polyps, causing them to atrophy and be expelled.

Saline, alkaline or dextrose enemas are of great value in the treatment of acidosis, particularly of post-operative type. The rectal drip is, of course, a very valuable means of providing fluid in the postoperative care of serious surgical cases. There is really no good therapeutic reason for the employment of milk, molasses, starch and other kitchen necessities in enema solutions.

The use of the opaque enema containing bariûm or bismuth salts in the fluoroscopic examination of the colon is of course just as much a diagnostic standard as the use of the ophthalmoscope, stethoscope or proctoscope.

Before the use of enemas, irrigations or colonic flushes is resorted to in the treatment of what is apparently obstinate constipation, a fluoroscopic examination of the colon is advised. The observations in patients who have had pelvic or abdominal inflammatory conditions, stormy confinements or previous abdominal surgical operations will often point to definite adhesions causing obstipation.

The use of any sort of colonic flush in these cases will be merely palliative and of no permanent benefit to the patient. The use of watery solutions for cleansing the bowel has a distinct and valuable place in the practice of medicine. Enemas should be administered in a safe, careful and correct manner in order to be of the greatest value.

The present tendency in some quarters to run riot on the subject of colonic flushes should be checked, or the abuse of a well recognized procedure may leave behind a trail of woe which will take a long period of re-education to overcome.

Gold Therapy in Leprosy.

By F. C. EUBANAS and B. DE VERA.

Journ. Philippine Isl. Med. Assoc., Vol. VII, No. 9,
September 1927.

EUBANAS and DE VERA treated a number of moderately advanced cases of leprosy by intravenous injections of triphal and of krysolgan respectively: both are highly complex organic compounds of gold. The initial dose of the former preparation was 0.01 gram in 1 to 2 c.c. distilled water and of the latter 0.0001 gram in the same quantity of solvent. The injections were repeated at intervals of from a week to 10 days. The trial was a relatively short one owing to limited supplies of the preparations, but the results suggest that there is a certain slight beneficial effect on the course of the disease.

The Rai Sahib Shambhu Dayal Sahib - Gold Medal.

WE have been requested by the Director of Public Health, United Provinces to insert the following notice:—

A gold medal called the "Rai Sahib Shambhu Dayal Sahib Gold Medal" will be presented for the best prize essay on a public health subject to be announced each year.

2. The subject for the essay for 1928 is "How can the public best co-operate with the Public Health Department in the prevention of cholera in rural areas."

3. The competition will be open to the general public, including the medical, public health and educational men in the United Provinces.

4. The essay is to be written in Hindi and should not exceed 3,000 words in length.

5. The essay should reach the Director of Public Health, United Provinces, Lucknow by 1st May, 1928.

6. The name and address of the competitor must be distinctly written on each essay submitted, and the envelope should have the words "Prize Essay" in the top left hand corner.

7. The Director of Public Health, United Provinces, shall judge the merit of the essay and his decision with regard to the award of the medal shall be final.

8. No correspondence will be entered into on the subject of competition.

No essay will be returned.

Duties of the State in Relation to the Nation's Food Supply.*

By EDWARD MELLANBY, M.D. (Cantab.), F.R.S.,
Professor of Pharmacology, University of Sheffield,
Honorary Physician, Sheffield Royal Infirmary.
(*British Med. Journ.*, 8th October 1927, p. 633).

In view of the great interest which is being aroused with regard to diets in India, a few extracts are given from this valuable paper.

State and local Government interference in matters of health, especially as it is affected by sanitation and drainage, water-supply, and limitation of spread of infectious diseases, is of benefit to the community. Is it likely that a similar interest in feeding will be followed by beneficial results of compensate order? Some may think not, but Dr. Mellanby speaking probably for all those in touch with modern work on nutrition held that the outcome of a sane and forceful effort on the part of imperial and local governing bodies in this field would lead to as revolutionary a change in the general health of the community as has followed their work on matters of public hygiene.

In a sense the problem of correct feeding is even of a more fundamental nature than that of general hygiene. When the diet is defective the most perfect hygiene as we know it will not prevent bad physical development, ill health, and early death.

The importance of vitamin-A in increasing the resistance of the animal to inflammatory conditions of the respiratory passages and lungs was alluded to as a forerunner of knowledge on the relationship between diet and resistance to infection. Purely metabolic disorders are brought about by incorrect diet; among these may be instanced the bone deformities and the defective dental structure and growth of jaws which follow deficient vitamin-D intake, the symptoms of scurvy due to deficient vitamin-C, the nervous symptoms due to deficient vitamin-B, the goitre due to deficient intake of iodine, the stunted growth due to deficient intake of biologically good proteins, and the ill effects of excessive and unbalanced cereals. These recently established facts are sufficiently important in themselves to justify the belief that it is a most profitable line along which the activities of the State should be directed and hastened.

With regard to research on nutritional problems, since the Medical Research Council was set up a large part of its activities have been directed to the solution of nutritional problems. It was a most happy occurrence for the progress of nutritional studies that the Medical Research Committee was appointed soon after the enunciation of the vitamin problem, and that Sir Frederick Gowland Hopkins, one of the original and present members played the leading part in this work.

The Medical Research Council has always been ready to support work on nutritional problems to the limit of its meagre resources. Unfortunately, its limited income is not the only drawback to rapid progress in this part of its work, for the field of workers upon which it can draw is very small. Work of this type does not attract young men, and even those who have

found themselves in this field have often arrived there by accident.

It is possible to foresee the end of this period of unpopularity, as even the scientist with the longest latent period cannot fail to be aroused by recent work on the antirachitic vitamin and its photosynthetic production by the action of ultra-violet radiations on ergosterol.

Dr. Mellanby went on to suggest that the following steps should be taken by the State in order to strengthen the control and executive power of the Ministry of Health in matters of nutrition:

1. That the Ministry of Health should set up a Board of Nutrition consisting largely of experts actively engaged in nutritional research, whose main duties would be: (a) to examine the results of the investigations carried out by those researching for the Medical Research Council, the Board of Agriculture, the Empire Marketing Board, and all others engaged in this field, both by studying their published work and, as far as possible, by personal contact with the actual investigations; (b) to advise the Ministry of Health to take action along lines which appeared to them advisable; (c) to recommend, or even to initiate, research on practical points where there is any obvious hiatus of evidence.

2. That the necessary authority be given to the Ministry of Health, acting on the recommendation of its Board of Nutrition, (a) to control the feeding of Poor Law institutions and prisons, and to advise in others, such as welfare centres or wherever public grants are made; (b) to publish authoritative statements, and, if necessary, give the evidence for such, on feeding matters to the general public; (c) to set up or control a food analysis department which includes not only the testing of food as at present carried out, but the standardizing of foods and other preparations for their vitamin content would be part of the duties of the Ministry of Health, acting on the advice of its Board of Nutrition. It is probable that official statements made to the press would be the most important method of teaching the facts to the average parent. At the present time this work is being attempted by several well meaning health societies, whose members have a strong conviction that diet is a very important subject, but whose knowledge of the facts is often lamentable.

The present method, which seems to be growing in popularity, of issuing manifestos to the press on dietetic subjects, is altogether wrong. These statements are often partisan in their origin and are frequently signed by men who, however distinguished they may be in their own lines, cannot possibly have any real knowledge of dietetics. The Board of Nutrition must supersede these well meaning efforts by better methods.

The maintenance, and increased facilities for obtaining special foods and the limitation of others, is probably a line of action that may prove useful.

The trend of scientific work on nutrition is to divide foods roughly, from the point of view of disease, into three classes: (1) "protective" or disease-preventing foods; (2) harmful or disease-producing, or, probably better, "protection-demanding" foods; and (3) neutral foods. Among the first, or protective foods, would be placed milk, eggs, green and other vegetables, fruit, cheese, meat, and fat fish. In the second, or disease-producing foods, are cereals and cereal products, including bread of all kinds (white flour or wholemeal flour), maize, oatmeal, rye, rice. The third, or neutral group of foods, would probably include sugar, pulses (peas and beans), pork and bacon, and white fish. These are tentatively arranged, and it might be desirable with further knowledge to redistribute the members of group (3) among groups (1) and (2). For instance, the way in which sugar seems to upset experimentally fed dogs suggests that under some conditions it is a harmful food, and if there were any lack of vitamin-B in the diet pulses would then pass into group (1).

* A paper read in Section of Preventive Medicine at the Annual Meeting of the British Medical Association at Edinburgh, 1927.

among the protective foods. It may be necessary to point out that the inclusion of cereals and cereal products among the harmful foods does not mean that these substances are devoid of nutritional properties. They have many excellent qualities in this respect, and their harmful effects can be readily antagonized by some of the members of group (1), or protective foods. At the present time, however, a sufficiency of "protective" foods is often not eaten, and poor physical development and bad health result in many individuals.

In view of these facts it would be desirable for our hypothetical Board of Nutrition to consider whether it was necessary for the Ministry of Health to take steps to make the "protective" foods—milk, cheese, butter, eggs, fat, fish, etc.—more easily procurable by increasing the supplies. It would probably be undesirable at the present time to limit the quantities of the "harmful" group—that is, cereals—available, for these are the cheapest procurable foods and form the basis of the average diet in the country, and especially in view of the fact, as stated above, that they can be made innocuous.

This part of the problem involves a discussion as to whether it is desirable for the State (a) to play a greater part in the teaching of cookery; and (b) to provide means of cooking food for public consumption. Greater facilities for the teaching of cookery will be provided by local authorities as the demands for such by the public increases. Better education and greater realization of the importance of proper feeding will no doubt hasten this demand.

Pernicious Anæmia a Symptom-Complex rather than a disease.

By G. LOVELL GULLAND, C.M.G., M.D., F.R.C.P.
(Edin.),

Professor of Medicine and Clinical Medicine,
University of Edinburgh.

(British Med. Journ., October 15, 1927, page 669.)

THE principal criteria are a high colour index, the presence of megalocytes, and, in the great majority of cases, leucopenia. Megaloblasts, if they can be found, are more helpful than usual. There may or may not be poikilocytosis, polychromasia, punctate basophilia, and other less important changes. We are all agreed that pernicious anæmia is essentially a toxæmia—a toxæmia which affects the blood and bone marrow more profoundly and more constantly than any other organ. The real problem is—what is the toxin? We do not know its nature. It is usually slow in action, gradually cumulative till its maximum effect is produced; if this is survived the patient recovers, sometimes very rapidly, either because the poison is exhausted or because a relative immunity is produced. Then the process begins again, and may be repeated several times. Can we accuse any known organism of causing the disease? The answer is, so far in the negative. There is no organism to be found in the blood itself. If a hæmolytic streptococcus were really the cause of pernicious anæmia we should expect and should find an entirely different series of blood changes. The same applies to the *Bacillus coli*, whose claims have also been mooted, with still greater force.

Moench, Kahn, and Torrey demonstrated that the fæces of 33 cases of pernicious anæmia contained a much higher number of *B. welchii* (and also *B. coli* and streptococci) than those of normal persons. Of these three organisms the only one really hæmolytic was the *B. welchii*. Kahn and Torrey have injected monkeys intravenously with *B. welchii* toxin in small doses, and claim to produce all the blood changes which are considered to be typical of pernicious anæmia.

It has been suggested that some spirochæte or protozoa might be responsible, but so far no definite evidence against either has been adduced.

Achlyia is practically constant but it is of frequent occurrence, not only among normal people, but in a host of debilitating conditions of the most various sorts.

One of the most striking facts about pernicious anæmia is that it does not develop out of an anæmia of low colour index, but, as far as I can judge, is primary in the sense that it is megaloblastic from the beginning.

Cryptogenetic or idiopathic pernicious anæmia is not the only form in which the disease occurs, but there are large groups of cases in which the cause is known, though we do not always know how the casual condition acts.

Bothriocephalus anæmia has a blood picture and symptoms identical with those of pernicious anæmia, and cure follows the removal of the worm.

A certain proportion of cases of sprue are also cases of pernicious anæmia.

Other groups of cases are those caused by syphilis and malaria, in both of which the marrow is probably primarily affected, and both of which can be cured by curing the original disease.

A different type is that associated with pregnancy. It is not very uncommon, and in my experience is not usually fatal, though it may be so.

Another condition which can produce the blood picture of pernicious anæmia is over-radiation.

The sum of all this is that there are many conditions, known and unknown, which can produce a megaloblastic anæmia; that we cannot hope to discover the cause of pernicious anæmia, because there are many causes. In other words, pernicious anæmia is a symptom-complex rather than a disease.

The treatment of pernicious anæmia is unsatisfactory, from the point of view of ultimate cure, but it is possible to do a great deal for these cases, and it is most important to approach treatment in a hopeful spirit. Nearly 100 per cent. recover, or should recover, from a first attack; the great majority will from a second. It is in the later relapses that real difficulty arises, and that our therapeutic resources are tested.

Rest, sunlight, fresh air, cheerful surroundings, general tonic measures, are important. Diet requires to be regulated by the patient's alimentary condition, and has to vary between the severe simplicity of peptonized milk in cases with much sickness, and a practically full diet when the stomach is not disturbed.

Hydrochloric acid is used as a routine measure, in medium doses it certainly helps appetite and improves digestion; but the huge doses that Hurst would have us use are not well borne. In cases associated with severe gastric catarrh the acid is not tolerated at all, and one has to fall back on ordinary sedative measures.

Arsenic remains our standby, and the best way of giving it is as the hydrochloric solution by the mouth, gradually increasing the dose till the patient's limit of tolerance is ascertained, and continuing with the largest dose that can be taken with complete freedom from arsenical symptoms until in favourable case a colour index below unity is attained. It should then be stopped and iron given instead. Cases recovered more quickly with arsenic by the mouth than if it given intravenously or intramuscularly, either in simple solution or as the organic arsenics.

Transfusion of blood is not curative, is sometimes not even useful but may be of great service in helping the patient round a critical corner when his vitality is exhausted by toxæmia, and may give him a chance to recover himself.

Normal horse serum, given either intramuscularly or by the mouth, sometimes seems to be of service when arsenic fails.

Intestinal antiseptics are not curative, but are often useful as adjuvants.

In no disease is it more difficult to estimate the effect of treatment, unless one has dealt with large series of cases, because of the tendency to remission which may come on at any moment without warning, and without cause. A recent case impressed this on me afresh.

Dramatic recoveries are more common in first and second attacks, but may occur even with later ones. One is inclined, therefore, to be sceptical about the result of any new line of treatment unless a large number of cases have been dealt with, and it has been found to be as useful in late attacks as in early ones.

Treatment of Pernicious (Addisonian) Anæmia with a Diet Rich in Liver.

By GEORGE R. MINOT, M.D.,
and

WILLIAM P. MURPHY, M.D.,

(*British Med. Journ.*, October 15, 1927, p. 674).

ONE hundred and twenty-five patients have been treated with the liver diet for from three months to three and a half years. The health of all has been distinctly improved. Not only has nearly every one of the patients responded promptly to the liver diet, but if they have continued to take it satisfactorily their red blood cell count has remained elevated, and in almost all instances above 4 million, and usually above 4.5 million, per cubic millimetre.

After feeding with large amounts of liver there occurs with extraordinary regularity a prompt temporary, often marked, increase of the young red blood cells (reticulocytes). This behaviour of the reticulocytes also suggests that liver stimulates the maturation of the megakaryoblasts.

Dr. Edwin J. Cohn has isolated an effective fraction, which represents about 1 per cent. of the liver. It contains nitrogen, but is non-protein in nature, is precipitated by alcohol, and soluble in water. The indications at present are that its effect is not due to known vitamins. A few grams of the purest fraction taken daily by mouth as a powder or in an aqueous solution is followed by a prompt and marked increase of reticulocytes and a rapid rise of the red blood corpuscles, and in a similar manner is as beneficial to patients with pernicious anæmia as whole liver.

Table showing the Rate of Increase of the Corpuscles for all of the 108 of the 125 Patients whose Red Blood Cells were below 2.7 million per cubic millimetre when they were first placed on the Liver Diet—no matter whether they took it well or poorly.

Time of Observation.	Average Red Blood Cell Count in millions per cubic millimetre.
Before diet begun	1.50
After diet taken about one month	3.36
After diet taken about two months	4.25
After diet taken from four to six months.	4.65

Failure to take a sufficient amount of liver or the presence of a complication, such as an infectious process, may cause the count to fall, or may cause it to rise less rapidly than might be expected. Damage to the bone marrow from multiple transfusions of blood may be a reason for an unsatisfactory response to liver feeding.

The health of six patients whose counts have not reached 4 million per cubic millimetre has been distinctly improved.

At the end of a year the average red blood cell count for all of the 60 patients who have taken the diet for this length of time was 4.52 million per cubic millimetre.

Eighteen of the patients have taken the diet for two years or longer, 3 of whom have done so for three years. At two years the average count was 4.65 and at three years 4.81 million per cubic millimetre. These high average counts have been persistently maintained, and the average for the patients who have taken the diet particularly satisfactorily is even higher.

As a rule the patients have felt and appeared well, except for disorders of the central nervous system, two months after starting the diet. The appetite has improved rapidly and often become ravenous. Gastro-intestinal symptoms have decreased quickly. Tongue symptoms usually vanished soon after liver was first taken and have not recurred in patients who have continued to take the diet well. The tongue has frequently become normal in appearance. Achlorhydria, however, has persisted in the 20 cases examined. Symptoms referable to the neural system have not definitely progressed or developed under adequate dietary therapy.

It will require often much time, tact, and sympathy to persuade the patient to take the correct food. Giving little other food than liver—by stomach tube, if necessary—has enabled individuals soon to take the full amount (150 to 225 grams cooked weight) and an adequate diet. Patients able to take more than 200 grams of liver a day may regain health faster than if less than this amount is taken. Cooked liver may be served in any way that pleases the patient, but prolonged boiling is to be avoided. The broth in large amounts is efficacious. Raw liver served as a finely divided pulp has been found particularly suitable. Many patients have preferred this to cooked liver because it is simple to take and can be swallowed rapidly. One hundred and eighty grams of the pulp (about equal to a similar amount of cooked liver) a day, divided into two portions, and taken mixed with orange juice or water mid-morning and mid-afternoon, is recommended.

It is advised that the diet be rich in fruits and greener vegetables and that it contain red meat.

It is desirable to curtail sweet foods and those rich in starch.

Reviews.

MALARIA IN INDIA.—By Major-General Sir Patrick Hehir, K.C.I.E., C.B., C.M.G., M.D., I.M.S. (Retd.). London: Oxford University Press, 1927. Pp. 490. With 15 colour plates and 109 figures. Price, 42s. net.

THIS splendid volume should be in every medical library in India, whilst it will interest every malarialogist in the country. The author's very distinguished career in India and during the Great War is well known; and now, in the leisure of his retirement, he has found time to put together this excellent symposium. The volume is much more than a second edition of the author's *Prophylaxis of Malaria in India* (1910); it is a complete and comprehensive memoir dealing with every possible aspect of the problem of malaria in India, and the amount of industry which must have gone into its making is amazing.

In a way, it is a pity that there is not more original matter in the book. During the War the author lost two large boxes of manuscript intended for this book and many hundreds of maps, plans, photographs, etc. In consequence the book is largely a compilation from many different sources. Thus the colour plates of the malaria parasites are from Byam and Archibald's *Practice of Medicine in the Tropics*, and Stephens and Christophers' *Practical Study of Malaria*; those of the anophelines of India—and very admirable they are too—are chiefly from Byam and Archibald's work, and

James and Liston's *Anopheline Mosquitoes of India*; the photographs of mosquito breeding sites and of anti-malarial measures are largely after Malcolm Watson's *Prevention of Malaria in the Federated Malay States*, with diagrams from Hardenburg's *Mosquito Eradication*; and the temperature charts from Manson-Bahr's *Tropical Diseases*. Yet even in this particular point, the author has rendered a very great service to the medical profession in India, for the collection together under one cover of all this valuable and excellent material gives the reader a volume which is at once comprehensive and authoritative. If there is—indeed—one word in which we should like to sum up the book it is in the adjective "comprehensive"; for that most adequately describes it.

The volume commences with a brief account of the history of malaria, which mentions the outstanding points, such as the discovery of cinchona febrifuge, the discovery of the malaria parasites by Laveran, of mosquito transmission by Sir Ronald Ross, and of the introduction of the Romanowsky stains, and other matters. Thereafter the book is divided into three main parts as follows:—

Part I.—The endemology, epidemiology, and ætiology of malaria in India.

Part II.—Clinical and pathological effects of malaria in India.

Part III.—Methods of prevention of malaria in India; followed by appendices, one of the most important of which deals with new knowledge on the subject which has been published while the present volume was in press. Thus the work is absolutely up to date, and contains much of the 1926-1927 literature. Christophers and Sinton's malaria map of India is also included; indeed from Appendix II we learn that this map was originally prepared for this book. The author has also borrowed largely from that invaluable fund of information, the *Annual Reports of the Public Health Commissioner with the Government of India*.

Throughout the book the author rightly stresses the economic importance of malaria, for this is the gist of the whole matter. At least a million deaths a year occur in India from malaria—probably more nearly a million and a half; whilst the amount of sickness, morbidity, and loss of labour which the disease causes is incalculable. "For some years to come," writes Sir Patrick, "the use of these drugs (the cinchona products) can only have a partial effect on the reduction of malaria in India, as at the present time not more than 10 to 15 per cent. of the cases of malarial infection occurring there are treated by quinine or cinchona febrifuge, and it will be many years before the latter drug can be manufactured at a price that the masses can meet.....I have also deemed it obligatory to deal with the bearings of the economic and sociological conditions of the masses of India on the reduction of malaria; frankness and conviction demand this, as these subjects are probably more important than the preventive measures detailed in the text. These measures, if properly carried out, can very materially reduce the malaria among the educated classes living in satisfactory economic, hygienic and social conditions, but they are at present beyond the education, comprehension and the means of the *unaided* rural masses; these masses preponderate incomparably over the well-to-do." And the author on page 426 discusses the question of the possibilities of a malaria tax. We regret that we have to agree with him; not until a very small malaria tax is levied—to be spent entirely on anti-malaria measures—will it be really possible to face the malaria problem in India on a suitable scale. "Millions die in the attempts to acquire immunity, chiefly children, while those who do acquire it go through years of suffering, and for the time being are wrecks of childhood and manhood. It is the work of the statesman, anti-malarial sanitarian, and especially of the educated and better-class Indian and landowner, to eliminate the suffering experienced in the immunising process, and to help the people to acquire immunity

through healthy environment, better houses, and better food." And here we are glad to note the emphasis which the author lays on anti-mosquito measures; for the recent report by the Malaria Commission of the League of Nations on the control of malaria in Southern Europe, in our opinion, has laid too much stress on quinine-prophylaxis, and we do not believe that quinine-prophylaxis is going to eradicate the malaria of India. It is the mosquito which counts most, and every area requires local investigation and survey. Pages 429 to 435, which deal with the economic and sociological questions connected with malaria in India, we consider to be the most important in the whole volume; they at least are original and forceful writing, and very much to the point. "Bonification" may not be the secret of malaria control, yet in many countries such bonification has produced a condition of anophelism without malaria.

To turn to the main body of the book, Part I is subdivided into eleven different sections; and in turn the author deals fully with the prevalence of malaria in India; the mortality due to it; its geographical distribution; contributory causes; predisposing personal causes; immunity or tolerance; the rôle of man in the distribution of the disease in India; epidemic malaria in India; the human carrier; and the Indian anophelines. This last section is extremely complete; it includes full synoptic keys after Christophers, dealing with both adults and larvæ; and a most valuable twenty pages devoted to the bionomics of Indian anophelines. The laboratory study of malaria is then fully dealt with, and we are especially glad to note how detailed is the account given of laboratory technique. In one respect we disagree with the author with regard to Leishman's stain. In the experience of the reviewer this stain should be poured over the slide, left on for half a minute only—(one minute is too long); and *double* the amount of distilled water added. To leave the undiluted stain on for one minute and only add an equal volume of distilled water is to invite a deposit of stain on the slide, under usual *tropical* conditions. Theories as to relapses, and such matters as culture of the malaria parasites are here dealt with.

Part II is essentially clinical, and is excellent. Here in turn the symptomatology of malaria is very fully dealt with, and—a specially useful section—the relationship of malaria to other infectious diseases, where the association of malaria and sunstroke is brought out. The pathology of malaria—clinical, chemical, and histological—is then dealt with; followed by a chapter on treatment, a section which we consider might be considerably expanded in a second edition, as it only occupies four pages.

Part III comprises the main section of the book and deals very fully with malaria control. Here, again, the very comprehensive character of the volume is very apparent. The use of the cinchona alkaloids is dealt with in detail, and we are glad to note that the author condemns intramuscular quinine—or at least mentions the ill-effects which may result from it—as do most leading authorities. Messrs. Howards have contributed to this section of the book, and the pharmacological notes on the cinchona alkaloids which it contains will be very useful to many workers in India. In Section 3 of this part, the author next takes up the question of mosquito control in India. Here, in 66 pages, we have a complete and very well illustrated memoir on the whole subject—drawn from many different sources, and admirably illustrated.

Section 4 of Part III deals with the prevention of malaria in human habitations in India, and deals respectively with cities and towns, villages, schools, houses, labour organisations, military cantonments—a chapter which is especially informative, and which includes much original matter from the author's own pen, as he has had much experience in this matter—in jails, and individual prophylaxis. Administrative problems in connection with malaria are next considered, and then finally come the appendices. These deal with

malaria statistics for India in 1924; the malaria map of India—an account from Christophers and Sinton; anti-mosquito legislation; a popular leaflet for propaganda work in connection with malaria; a malaria survey questionnaire; and very recently published new work on malaria. The volume is well indexed, the index occupying 25 pages.

It only remains to add that the work is most admirably published, and well up to the very high standard of the Oxford University Press. The reproduction of the colour plates is altogether admirable. Glazed art paper is used throughout, and the volume is of convenient size and form. (One point—however—we may perhaps be permitted to bring to the notice of the publishers, and of other publishers at Home who publish books for sale in the tropics. This is that cockroaches in the tropics immediately attack all books printed in the United Kingdom. In the tropics, we understand that it is usual to incorporate a certain amount of bluestone in the paste used for binding, as this defeats the attacks of cockroaches and "fish-insects." The review copy of this book which we received, although brand new, is already cockroach-eaten, whilst a copy of Wenyon's *Protozoology*, received in August 1926, already looks moth-eaten, although in daily use.)

Sir Patrick Hehir and the Oxford University Press are both to be warmly congratulated on the publication of this book. It will be invaluable to malarial workers and public health authorities in India, and—we hope—in constant demand. It gathers together in compact—and admirably illustrated form—the whole of the literature on the subject. It is especially noteworthy for the tremendous amount of detailed information and illustrations which the author has collected together within the compass of a conveniently-sized and eminently readable volume.

MODERN MEDICINE: ITS THEORY AND PRACTICE.
—Edited by the late Sir William Osler, Bart., M.D., F.R.S. and Thomas McCrae, M.D. Vol. V. Third Edition. London: Henry Kimpton, 1927. Pp. x plus 948. Illustrated. Sold only in sets. Price, £12-12 per set.

VOLUME V of Osler and McCrae's *Modern Medicine* is divided into six parts dealing respectively with diseases of the blood, diseases of the lymphatic system, diseases of the ductless glands, diseases of the urinary system, vasomotor and trophic disorders and diseases of the locomotor system, comprising the combined labours of nineteen contributors. Criticism is almost superfluous: Osler and McCrae's work ranks with Allbutt and Rolleston's system as one of the standard sources of reference on matters medical, and the present edition (so far as the volume under review is concerned), does not fall short of the traditional excellence. Each subject is dealt with in a thoroughly complete manner by an acknowledged master in the particular field concerned; all the recent advances are referred to. In a rapid but fairly complete survey of the work we were particularly impressed by the following:—The physiology of the pituitary gland. This is one of the most complete expositions of the whole subject that we have been privileged to read. The treatment of exophthalmic goitre, one of the most fruitful subjects for debate between physicians, surgeons and radiologists, is dealt with in a clear and impartial manner. The section on diseases of the urinary system: there is an admirably fair presentation of the conflicting views on urinary secretion, and in connection with nephritis there is a timely warning against trying to predict the pathological state of the kidney from the clinical signs and symptoms presented by the patient.

There are one or two very minor blemishes which we hope will be removed in future editions. In page 23 the reader is referred to Plate III, Figs. 1 and 2 MA for a view of "mast" cells. This should be Plate IV, Figs. 1 and 2 MA. On page 48, reference is made to 2,000,000 red corpuscles per cubic centimetre instead

of per cubic millimetre, and on the following page the same error is most unfortunately repeated twice.

There is an error of exactly similar type (in connection with blood platelets) at the foot of page 114. On page 71 line 7, "as an acute sepsis" should be as in acute sepsis" while on page 289 "specific strains" should read "specific stains"; we suggest "propionic acid" for "profrionic acid" on page 322. In a lesser work such errors, (largely we believe attributable to the printing room), might have been passed without comment, but occurring in *Modern Medicine* we feel that they detract from its otherwise supreme excellence.

J. M. H.

PREVENTIVE MEDICINE AND HYGIENE.—By Milton J. Rosenau. Fifth Edition. New York and London: D. Appleton & Co., 1927. Pp. xxv plus 1458. Illustrated. Price, 42s. net.

THERE are many good books on public health but few wise ones; Rosenau's is to be classed as both. "Knowledge comes but wisdom lingers" is a trite saying, truer as regards preventive medicine than many other things. In the past twenty years it has been recognised by sanitarians that good environmental conditions, though absolutely essential for maintaining good health, are really not so fundamentally connected with the improvement of the human race as we thought. Good human protoplasm nurtured in a good environment is what is wanted, and we are only beginning to have glimmerings of how to attain this. In this respect one generation is the custodian of the next, and the unborn have the right to demand and expect that best of all birthrights—good human protoplasm. Hence it is that heredity and engenesics find a place in the modern public health textbook; and the sanitarian (in the wide sense) who would be up in his subject must have more than a nodding acquaintance with psycho-analysis and mental hygiene. Amid the swaying controversies that surround the study of heredity, one fact shines out which the everyman of to-day should know, that the germ plasm entrusted to man and woman is the most precious substance known, that to pass it on to the next generation in as good or better a condition than that in which it was received is a duty, but to pass it on in a damaged condition is a crime which no fabled circle of the Inferno could ever expiate. Injury to the germ cell is irreparable and transmissible. But Nature's methods are sometimes insatiable. The race is not always to the swift nor the battle to the strong. Degenerates and defectives have little self control and are very prolific. In England the feeble minded are increasing at twice the rate of the general population. Feeble mindedness produces more pauperism, degeneracy and crime than any other cause; it touches every form of charitable activity; its cost to the State (that is to the ordinary individual) is enormous.

Heredity is the overshadowing influence of first and prime importance. Environment may influence the individual, but apparently has small and slow power of propagating itself for good; great and rapid power for evil. But Nature and nurture "heredity and environment" all play important rôles in the final moulding of the individual body and mind. The sensible attitude is to be concerned with progeny rather than with ancestry, and to continue the struggle for betterment.

The chapter on "Mental Hygiene" by Abraham Myerson is well worth reading; and everyone should understand the elementary psychology of the introvert and the extrovert, and should read the paragraphs on the upbringing of children. We believe it pardonable to quote in *extenso* from the paragraph on desire and satisfaction—The laws of normal desire and satisfaction will some day constitute the basis of a programme of mental hygiene. We know that civilization enormously complicates what we call our needs, so that the luxury of one time is the absolute necessity of another. The rise of æstheticism breeds hyperæstheticism; which really means that those so afflicted find

many more things to disgust and dissatisfy than to please them. Refinement brings it about that one finds a subtle pleasure in the very nice adjustment of things, but also it brings about the little disharmonies are keenly felt, and the pinpricks of life become tragedies. The mounting of desire and taste is a part of civilization, yet it is a part fraught with neurasthenia and an anhedonic reaction to life; that is, a reaction of lost desire and satisfaction. Simplicity of taste, robustness of satisfaction—to maintain these is to maintain happiness and mental health. And the formula for maintaining them is not easy to find and harder to follow in a competitive world where people measure the value of what they have by a comparison with the acquisitions of others. If we could get a real picture of the inner life of men and women of a striving, civilised community, we would find in it an appalling amount of heartache and dissatisfaction, bred by envy and jealousy of others. The struggle for existence, tense as it naturally is in our industrial civilization, is intensified a hundredfold by a struggle for superiority in things which are of no real value. This struggle breeds fatigue, disgust, and depression. Its only cure is a philosophy of life which has been preached at mankind from time immemorial, but which is difficult to follow, though all men theoretically accept it. 'Thou shalt not covet' is its essence, however, amplified it may be.

When a man commences to find that his desires are finicky and his satisfactions vague, when appetite for food, sex, sleep, commence to disappear, when he is as fatigued in the morning as when he went to bed, when the pleasure of work and play become difficult to obtain, it is time for him to take stock of himself and his habits of life. Changes in mood and feeling are as important and need attention as much as shortness of breath and indigestion."

The chapter on water is very good; that on sewage disposal hardly full enough for English requirements. English plumbing is different from American, and the diagrams in this chapter would certainly be criticised in England. Air and ventilation are clearly dealt with, though English works on this (Hill's for example) are rather scrappily discussed. Estimations of comfort in our opinion are more easily and more simply carried out by the *kata thermometer* than by the *effective temperature chart* process.

The chapters on vital statistics and statistical methods are not by Rosenau. It is a pity he did not get his late friend Whipple to do these chapters. The former is not detailed enough, and the latter is much too compressed.

Tropical matters are dealt with quite well, though we do not agree that *A. sinensis* is the chief malarial carrier in India, or that bedbugs carry European relapsing fever. The work on *Leishmania donovani* by Knowles, Napier and Smith, with *Phlebotomus argentipes* is noticed; the pentavalent antimony compounds for treatment however are not mentioned.

Perhaps not a perfect textbook for every climate and country, but a very stimulating one and a pleasure to read. No one interested in preventive medicine and hygiene can afford not to have the latest edition of "Rosenau" on his table.

Perhaps it is rather premature, but we would like to see in the next edition the chapters on "The Newer Epidemiology" developed on the lines of the work of Topley and others.

A. D. S.

HYGIENE AND SANITATION: THE ESSENTIALS OF MODERN HEALTH CARE.—By Jesse F. Williams, M.D. London and Philadelphia: W. B. Saunders Company, Ltd., 1927. Illustrated. Pp. 344. Price, 10s. net.

THE American nation at the present time is probably the most favoured of all. Her geographical position gives her a freedom from many of the world's worries; her natural resources and vast territories and immense wealth secure for her a freedom or at least a remote-

ness from these international jealousies and a postponement of these difficulties, generally called Malthusian, which have involved European nations oftentimes in war and disaster.

With the world's history behind them, and with knowledge, wealth and experience in their grasp, it is natural that thoughtful Americans should be considering whether as a nation they are making the most of their opportunities. The present book is intended to present the fundamentals of health and personal hygiene in a manner suitable for teacher and student. The essentials for obtaining and maintaining personal health are clearly and interestingly stated, and the necessity for both knowledge and practice insisted on. There are chapters on all the seven ages of man, and on the eighth that Shakespeare missed out, the prenatal stage; and mental hygiene is very sensibly discussed and explained.

A style of sentimental optimism is rather common in American writers on health matters. When we had read a little of this book we said to ourselves, *Meus sana in corpore sano* is of course bound to appear soon, but can the author withstand the temptation of *God's in His Heaven, all's right with the world*? Page 66 gave us the one and page 88 the other. *The child is father to the man* is quoted as an old saying, but we like to think that *the child is father of the man* was penned for the first time by Wordsworth. Has Roosevelt so soon earned the title "immortal"?

We recommend the book as an admirable and sensible presentation of what health is and how to obtain and retain it.

A. D. S.

AN INTRODUCTION TO NEUROLOGY.—By C. Judson Herrick. Fourth Edition. London and Philadelphia: W. B. Saunders and Co., Ltd., 1927. Pp. 406. Illustrated. Price, 12s. 6d.

THERE can be no doubt that neurology is now established as an important subject in biological science. Here we have a work of 400 pages, and yet it but merits the title of an introduction. This indeed shows the vastness, as well as the importance of the subject. Professor Herrick presents us with the fundamental facts of neurological science in a manner which is as simple as possible.

The book is divided into three main divisions. The first of these discusses the more general neurological topics; such as "the nervous functions" and "the reflex circuits." These matters are dealt with in a general way, and not only from the limited aspect of the human body.

The second part describes the general anatomy and physiology of the nervous system. This description again is of a comparative nature, and is well illustrated with diagrams showing the anatomical relations, both of the human system and those of many of the lower animals.

A chapter on pain and pleasure from the physiological aspect is of particular interest.

The third part is devoted to the cerebral cortex and its functions.

There is a most extensive bibliography, and this is arranged after each chapter.

It must be understood that this book is not in any way a book on nervous diseases. It is rather an introduction to neurology in its much wider sense.

It is difficult to imagine that it would be useful to the medical student in India, who is already overburdened with "ologies."

That it has reached a fourth edition is evidence of its value, but in India we have not yet students who take advanced courses in the various subdivisions of anatomy and physiology.

H. H.

HOW TO MAKE THE PERIODIC HEALTH EXAMINATION.—By E. L. Fisk, M.D. and J. R. Crawford, M.D. New York: The Macmillan Company, 1927. Pp. 393, with illustrations.

THIS is an excellent book with an inadequate title, for it really amounts to a textbook of routine clinical

methods. The authors, having pointed out the importance of the periodic health examination in the preface and introduction, continue with a detailed description of the methods that should be employed.

The first section emphasises the importance of accurate histories and thorough examination, and includes specimen forms for the recording of results.

These forms are a great deal more complicated and cover far more ground than the medical forms of the most exacting American insurance company.

They rather appal the reviewer. The medical examination form includes, besides ordinary clinical examination, a full *schema* for the examination of the eye; focal errors, muscle balance, optic disc (with chart). This is followed by a fairly complete examination of the nose and ear. Next the teeth, and the form includes a dental chart with fifteen different possible defects for each tooth.

The clinical examination follows the ordinary routine and is most thorough. The space to be filled in under genito-urinary system includes penis, urethra, testicles, epididymis, seminal vesicles and prostate, the last having six subdivisions.

In the introduction it is stated that this examination can be carried out in one hour, and that specialists are only required in borderline cases. This may be so in America, but the reviewer must confess that he knows of no medical man who would carry out all these examinations in such a way that he would recognise early pathological changes, which after all is the main reason for periodic examination. The greater part of the book is devoted to a description of the methods of regional examination. This is really excellent and amounts to a detailed account of how to carry out the clinical examination of each part of the body. Each section is preceded by an introduction by a specialist, and in these introductions we learn the reasons why the examinations of each particular part is of importance. The various sections are admirable and the methods of examination are very fully described. We find that on looking at the protruded tongue ten points are to be noted. The chapter on the circulatory system is perhaps the best, and the authors insist on the importance of electro-cardiographic examination in doubtful cases.

It is likely that in the examination of presumably healthy people of mature age, we shall find a defect in kidney function more often than a defect in any other organ. It seems to the reviewer that this is not sufficiently emphasised in the chapter on the urological system.

The section on laboratory methods and standards is very valuable. It includes all the more important examinations. The technique of the methods is not of course within the scope of this book, but we have not seen the indications for, or the interpretations of the examination results better described elsewhere.

There is a chapter entitled "Counselling." This is of course the advice that should be given to the patient as a result of the examination. But the chapter contains more than this. Explanations of the methods of dieting, exercise and mental hygiene find a place. We are glad to see that the "Counselling" includes a letter and report to the patient's family physician.

An appendix contains many specimen charts and forms. These are all interesting, but in some cases seem rather complicated.

We all know in India the "complete urine analysis form," but here we have similar forms for many other examinations that are becoming commonplace. Gastric analysis, basal metabolism test, x-ray examination of the heart and aorta are a few out of many. It seems desirable that such reports should be given to the physician on a standard form. There is a full bibliography and an index.

It is difficult to assess the value of this book to practitioners in this country, for it will be many years before such periodic examination can be carried out in this manner in India. But here the information is not confined to the routine of such procedure only, for we

learn the best methods of conducting the examination of any of our patients, whatever may be their complaint. More particularly are we shown the indications for the more complicated methods which modern science demands, and the interpretation of the results. This book must prove invaluable to the intelligent student, for if he follows the procedure laid down his work must become methodical and logical.

The practitioner, also, will always find in it much of value. A study of the methods of examination advocated should save much time that is at present wasted, owing to haphazard methods of investigation.

H. H.

RESEARCHES IN POLYNESIA AND MELANESIA: AN ACCOUNT OF INVESTIGATIONS IN SAMOA, TONGA, THE ELLICE GROUP AND THE NEW HEBRIDES IN 1924-25. PARTS I—IV, MEDICAL ENTOMOLOGY.—By P. A. Buxton, M.R.C.S., D.T.M. & H. London: Published by the London School of Hygiene and Tropical Medicine, 1927. Pp. 260, with 12 plates. Price, 10s. 6d.

THE volume under review forms Part I of the results of an expedition to study filariasis in the Islands of the Pacific, and is devoted to the entomological side of the problem. In addition to this, there is a short account of the malaria problem of the New Hebrides group, the depopulation of which has already been treated of by the same author in a most interesting paper elsewhere (*Trans. Roy. Soc. Trop. Med. Hyg.*, XIX, 420—454), and a short account of the general medical entomology of the region.

Let it be said at once that the investigation is a model of what such should be. In the first place the relationship of the two carrier species, *Aedes (Stegomyia) variegatus* Doleschall, and *Aedes (Stegomyia) argenteus* Poir., *fasciata* Fab. is shown to the rest of the Culicine fauna and to the topography of the Islands. Thereafter the field biology of the two species is studied in detail. The second half of the book is then devoted to a series of carefully designed experiments to elucidate individual points in the bionomics of the two species.

Once again hydrogen ion concentration is shown not to be a natural controlling factor, though gross experimental differences are effective. As careful a study of meteorological conditions as is possible, outside a fully equipped observatory, shows that no climatic factor, or even the differences in the amount of radiant heat received from the sun at different seasons, affects the insects. But, in the reviewer's opinion, this conclusion is not universally applicable. The variations recorded in all factors are small, as would be expected on an oceanic island within the tropics, and the portable "Radiation Integrator in vacuo" evolved by the author, which can be used by workers other than trained physicists, should prove an extremely valuable weapon in climates with greater ranges, where one of the factors most requiring measurement is the number of units of heat absorbed by different bodies of water from the commencement of the spring temperature rise.

Turning to the actual experimental work, all investigators should well ponder the five "conditions of experiment" laid down on pages 127-8. After indicating that some experiments which now appear effectively controlled are not, owing to the impossibility of controlling any factor imperceptible to man but of great importance to the mosquito, and showing that through neglect of obvious precautions much of the already large accumulation of experimental results obtained for *Stegomyia fasciata* must be rejected, there follows the thought-compelling statement, "when, therefore, an experiment has led to a definite conclusion, one should devise a second experiment which does not exactly repeat the conditions of the first, but has the same conclusion in view." One wonders how many experiments, of one's own and of others, have been falsified on account of the omission or impracticability of applying such a double

test. Mental discomfort as to the validity of results makes for progress.

There follows a mass of experimental detail on the factors possibly affecting oviposition, hatching, and the existence of larvæ and pupæ, which there is no object in categorically stating in a review. All interested must consult the original for themselves. However, the main conclusion reached is that "the large amount of experimental work.....performed has on the whole added to the pre-existing confusion." In making this statement, the authors have most unduly belittled their own work. If definite results are few [and from this work has come the re-discovery of the method of inducing oviposition in fluids immediately fatal to the emerging larvæ, which the author has already published as "Race Suicide in *Stegomyia*" (*Bull. Entom. Res.*, XVI, 151-3)], they have at least cleared the ground of any fallacies introduced by previous experimenters, and set forth a series of definite and properly controlled results. That these as yet elucidate nothing completely is certainly disappointing, but none the less stimulating. The ground has been cleared for further and more intensive effort. With every advance, it is true, the complexity of the problem becomes more apparent, but there is no need to despair. That the solution is there is certain, and as a fellow worker on the same problem the reviewer emphatically states that the present series of results will afford matter for consultation and comparison for years to come. As pointed out by the author, the problem of *Aedes* are the problems of *Anopheles*, the most important aspect of all medical entomology, in a simpler form.

R. S-W.

THE OPERATIONS OF SURGERY.—By R. P. Rowlands, O.B.E., M.S., F.R.C.S. (Eng.) and Philip Turner, B.Sc., M.S., F.R.C.S. (Eng.). Two Volumes. Seventh Edition. London: J. & A. Churchill, 1927. Pp. 1940, with 900 illustrations (43 in colour). Price, £3-10-0.

It is twelve years since the sixth edition of Jacobson's famous book was issued and one had begun to fear that it was doomed to extinction, along with Erichsen, Bryant and other great books of the past. In surgery, as in other branches of science, it becomes increasingly difficult to keep an old book abreast of advancing knowledge without rewriting it to such an extent that it has almost totally lost its original character. The disappearance of Jacobson's name from the title would seem to indicate that the present authors, who in the preparation of the sixth edition practically re-wrote the volume on abdominal surgery, feel that this stage has now been reached. Still those who can recall the late Mr. Jacobson's gifts as a teacher, his profound erudition, his quaint personality and his homorously sarcastic manner will regret that his memory was not perpetuated for at least one edition after his death.

There are many good books on operative surgery written for the student, concise and dogmatic; there are others intended for practitioners, equally dogmatic but not so concise, which give excellent accounts of the exact technique considered best in his particular branch by each one of a group of specialist writers, none of whom waste much space in discussing other methods than those which their experience has led them to adopt. Jacobson's book differed from these in the breadth of its outlook, in the philosophical discussion of pros and cons, and in the author's profound knowledge of the literature of the subject which was reflected in his writings.

The work of revision has been done with great care and the authors have preserved the original character of the book as far as possible while bringing it up to date. Room has been made for new matter by cutting down old case reports, discarding old methods, shortening many of the discussions on indications for operations now falling out of use, and by the free use of small type. We miss the numerous references to "my old friend Mr....." and "my late colleague Dr....." which gave such a human touch to famous editions. Many footnotes which were added in the last edition still appear as footnotes, though they often deal with

such important points that their proper place is in the text. The result of this process of compression is that the book is practically unchanged in length, though much new matter and many additional illustrations have been added. All the old sections on ligations of arteries with their beautiful coloured illustrations are preserved for the benefit of examiners, but it is to be regretted that the new anatomical nomenclature is not given as well as the old.

It is impossible to do more than indicate briefly the principal changes which have been made. The advances in surgery made during the war have all been incorporated, and we find excellent new sections on shock, regional anaesthesia, blood transfusion and guillotine amputations. The chapters on head injuries, wounds of great vessels and wounds of the chest and abdomen have been entirely re-written, borrowing freely from the official history of the war. Mr. Trethowad is mainly responsible for the orthopaedic operations and though we find excellent accounts of bone grafting and of the surgery of spastic and infantile paralysis, those of arthroplasty are too short to be of any value. The chapters on cranial surgery have been re-written and the writings of Tooth and Cushny are freely quoted, the technique of alcohol injections of the branches of the fifth nerve and the modern operation on the Gasserian ganglion by neurectomy of its sensory root are included. The articles on the tongue and on the thyroid follow the old lines too closely, there is no mention of the use of diathermy in excision of the tongue, nor of the wedge resection method of partial thyroidectomy nor of the method of safeguarding the recurrent laryngeal nerve by leaving a slice of thyroid tissue in situ. The chapters on plastic surgery of the face have been entirely re-written, incorporating Gillies' work and also his highly original operation for cleft palate. A much fuller discussion of the present position of operative treatment of tuberculous glands of the neck and some anatomical illustrations would be a welcome addition. The modern views on the spread of breast cancer are well described, but the method of operation advocated—by dealing with breast first and finishing with the axilla, is not that adopted by most surgeons. Recent work on the surgery of pulmonary tuberculosis, the thoracoscope and division of the phrenic nerve are fully dealt with. The changes which surgery has undergone are sharply brought out by a comparison of the chapters on operations on the lower extremity in the present edition with those in the former. The long discussion on the control of hæmorrhage in amputation at the hip joint has disappeared, the 10 pages which were devoted to excision of the hip have come down to 2, Carden's, Gritti's and Stokes' amputations have been scrapped, along with tarsectomy, excision of the knee joint and all except one method of excision of the ankle joint. Periarterial sympathectomy and some of Hey Groves' reconstruction methods are included and of course Albee's and Hibb's operations for fixation of the spine.

In Volume II which deals almost entirely with abdominal surgery we find fewer changes. In the sections on hernia there is a lot of new matter, including a detailed description of Mr. Turner's own operation, but it is surprising to find no mention of the work of Gallic and Lemesurier. The authors are conservative in their operative treatment of gastric ulcer, they advise excision combined with antacid treatment in most cases rather than the antacid method of intestinal anastomosis together with Fraser and Dotts application of it to excision of growths of the colon. All reference to Murphy's button is omitted—another milestone marking the change of methods. Long and excellent sections on diaphragmatic hernia, on diverticulitis and on reconstruction operations on the bile ducts and the ruthless cutting down of the chapter in which Lanes' views on intestinal stasis were expounded indicate the changing views of surgeons. Thomson Walkin's operation for enlarged prostate is described and also Young's method of perineal prostatectomy with many of the original illustrations, but the preliminary investigations on which the decision to operate in two

stages is made might be given on more detail. The chapter on malignant disease of the rectum has been brought up-to-date and Kraske's operation has been dropped out, as it has in the practice of most surgeons.

It will be seen that, with the exception of a few points criticised, the book has been brought well up-to-date. It has always been a favourite with serious students and with candidates for the final F.R.C.S. examination. We consider that the present maintains the traditions of the former editions and that the book will maintain its former popularity.

W. L. H.

EMERGENCIES OF A GENERAL PRACTICE.—By N. C. Morse, A.B., M.D., F.A.C.S. Revised and Re-written by A. W. Colcord, M.D. Second Edition. St. Louis: The C. V. Mosby Co., 1927. Pp. 541. With 311 illustrations. Price, \$10.00.

THIS book gives in comprehensive yet succinct form an account of those emergencies which arise in the course of every general practice: it will be welcomed by the practising physician who would otherwise have to seek out his information from numerous works on surgery, laryngology, ophthalmology, obstetrics, etc.

After a preliminary chapter in which are set forth useful lists of emergency instruments, solutions and ointments in common use, Dr. Colcord passes to a consideration of the removal of foreign bodies from the ear, eye, throat, rectum, etc. He sounds a note of warning on the possible results of ill-timed efforts at removal, and urges that the aid of a specialist be invoked in all cases except those of great emergency where every minute is of value. There is a well merited appreciation of the work of Chevalier Jackson on the use of the laryngoscope, bronchoscope and oesophagoscope.

Chapter III is devoted to first-aid: in the treatment of shock, the importance of getting the patient away from gaping crowds, keeping off hysterical relatives and refraining from fussing is perhaps too little appreciated. The following chapter deals with asphyxiation from drowning, smoke, gas and electric shock: the section on carbon monoxide poisoning is particularly well done and the necessity for immediate rest even in mild cases of poisoning by this gas, in order to conserve the oxygen supplies of the body is strongly urged. The subjects of shock, wounds and bruises are then considered: in connection with the first of these it is pointed out that the use of heart stimulants in exhaustion shock is futile and may be actually harmful. The account of the general treatment of a wound (say of the forearm) in the surgery is excellent: reference is made to the Carrel-Dakin method of wound sterilization and to the work of Kanavel on infections of the hand. The section on bruises and sprains is fuller than is commonly found in text-books of surgery.

The treatment of various emergencies of a surgical or medical nature, including ptomaine poisoning, is next taken up; then follows a section on burns with an account of the modern paraffin method of treating this form of injury. The remainder of the book, with the exception of a brief but very welcome chapter on extraction of teeth, is mainly devoted to the subjects of fractures, dislocations, amputations, obstetric emergencies, and poisoning. The value of inspection in the diagnosis of fractures is pointed out, and the danger and unnecessary pain associated with misguided attempts at eliciting crepitus are emphasised.

The use of water "and plenty of it" in the immediate treatment of burns by strong mineral acids is recommended: the application of alkalis in such cases merely induces a brisk chemical action which probably increases the existing tissue damage.

There is little to criticise in this excellent volume. We had not hitherto imagined, however, that Tacitus lived as early as 450 B. C. (p. 78): *without* (at the bottom of page 89) is an error in printing, but surely 70 to 20 per cent. (p. 90) is wrong. Perhaps rather a fuller account of the sites at which spouting arteries

may be most usefully compressed might have been given. In the description attached to Fig. 95 (p. 181) "Is applying" should read "In applying." In connection with the reduction of hernia mention might have been made of the fact that pulling down the mass immediately prior to its attempted return to the abdomen not infrequently relieves the swelling at the neck of the sac and enables the subsequent manipulations to be carried out with greater possibility of success. On page 332 "spinal" should be "spiral": if Fig. 182 represents a fracture of the *right* clavicle as stated, it seems rather unusual that the following four figures should show the same subject being treated for a fracture of the left collar bone. Fracture of the metacarpal "of" the proximal phalanx (p. 371) is again a printing error, but surely Dupuytren's splint is not applied in Pott's fracture in order to cause *eversion* of the foot (p. 395). The symptoms and diagnosis of fractures of the base of the skull are rather briefly dealt with and the composition of Schleich's solution (p. 217) might usefully have been included. These minor blemishes do not detract from the general excellence of the work: it is a book that no general practitioner should be without.

J. M. H.

A STUDY IN TUBERCLE VIRUS, POLYMORPHISM, AND THE TREATMENT OF TUBERCULOSIS WITH OLEUM ALLII.—By William C. Minchin, M.D. (Dub.). Third Edition. London: Ballière, Tindall and Cox, 1927. Pp. xvi plus 110. With 26 plates and 1 text figure. Price, 25s. net.

THIS book is divided into two parts: Part I is a study of tubercle virus, while Part II deals with the treatment of tuberculosis with oleum allii, or oil of garlic. Researches extending over a number of years have forced the author to the conclusion that tuberculosis is not entirely explained by Koch's bacillus. He supports his contention by reference to the well-known fact that microscopic examination of pus from clinically tuberculous joints and glands, of exudates in cases of pleural or peritoneal tuberculosis or of meningitis frequently fails to detect the presence of the abovementioned organism.

Tubercle bacilli often contain spheroidal bodies and to these the author attributes the disease: the bodies in question have been noted by different workers and have received different names. The author of this volume refers to them variously as "spheres," "yeasts" and "granules": some of them at least are identical with the granules described by Much and called after his name. Two different varieties are distinguished, a larger type staining deep black-violet with Ziehl-Neelsen's stain and a smaller staining red by this method. The former can undergo extensive metamorphosis and some at least are converted into bacilli. The "granules" or "spheres" are filter-passers; filtrates of tuberculous pus containing them but free from bacillary forms have given rise to typical generalised tuberculosis in guinea-pigs with numerous bacilli scattered through the body. Such bacilli have arisen from the "spheres" or "granules": in active disease bacilli are seldom found but active budding of the "spheres" is always present.

The author's arguments may, in his own words, be summarised thus:—"Now the T. B. virus exists as a rod, stretching and dividing: as a yeast sphere elongating into a bacillus; and as a yeast sphere reproducing by the process of budding."

In view of the above, the ideal drug for the treatment of tuberculosis should be one which is rapidly absorbed and which is capable of destroying the "spheres": such a drug is oil of garlic, the beneficent properties of which are due to the allyl groups which it contains. Very remarkable results have been obtained by the author in cases of pulmonary and laryngeal tuberculosis, bone and joint tuberculosis and in lupus. He insists on the fact that results can only be achieved when the oil can get at the "spheres." In shut-away cavities where those offenders are protected by fluid,

improvement cannot be hoped for until the focus has been thoroughly opened up by surgical measures. Oil of garlic can be used in various ways—by external application as a poultice, by internal administration, and by inhalation: the last method largely overcomes the objectionable odour that appears in the breath when the drug is orally administered.

We have little to criticise in this book: the views put forward are certainly worthy of further study. The author states (page 43) that he has obtained good results from "Yadil." This preparation and the makers thereof were exposed some two years ago by a leading English newspaper. It was conclusively shown at the time that the chemical composition of "Yadil" was apparently not the same as that claimed by the manufacturers. Leading pharmacologists also gave it as their considered opinion that its pharmacological and therapeutic actions were probably nil.

The photographs and micro-photographs, the printing and the general get up of this volume are alike good.

J. M. H.

MINOR SURGERY.—By A. E. Hertzler, M.D., F.A.C.S. and Victor E. Chosky, A.B., M.D., F.A.C.S. St. Louis: The C. V. Mosby Co., 1927. Pp. 568. With 438 illustrations. Price, \$10.00.

In this admirable little book the authors have succeeded in placing before students a clear picture of the various conditions they may be expected to see daily in any surgical out-patient department. Its title, *Minor Surgery*, describes it accurately, for in no place in the book is anything in the nature of major surgery touched upon, with the possible exception of the radical cure of inguinal hernia. Each region of the body is dealt with in turn and all the common accidents and ailments which are likely to happen to it, and their treatment are described in an excellent manner. A prominent feature is the wealth of good photographs and diagrams with which the book is endowed, and which greatly help the student to understand the text and recognise conditions. We consider this *Minor Surgery* to be one of the best of the smaller works on surgery, and recommend that it should be read by all young medical men and women who are about to take up an appointment of house surgeon.

THE HEART.—By Alexander G. Gibson, D.M., F.R.C.P. (Lond.). Bombay: Oxford University Press and Constable and Co., 1926. Pp. 108. Price, 5s. net.

This is one of a new series of Oxford Medical Handbooks, designed to deal shortly with the fundamental principles which underlie their subjects and to illustrate these by their application in general practice. Its appeal is therefore primarily to the general practitioner. The question of what to include and what to omit must always be a matter of opinion in a synopsis and the author craves indulgence on this question. On the whole he has succeeded in compressing into small space most of the essential facts about the heart and its diseases. If we have any criticism to make it is that more space might have been given to the medicinal treatment and the modern work on the standardisation and use of digitalis, and on the indications for quinidine. No bibliography for general practitioners should omit *The Beloved Physician*, for he will find in the description of Mackenzie's investigations, the solution to just those cardiac problems that text-books rarely seem to solve.

OBESITY.—By Leonard Williams, M.D. Bombay: Oxford University Press and Constable and Co., 1926. Pp. x plus 171. Price, 10s. 6d. net.

Dr. Williams is best known as the author of *Minor Maladies*, an invaluable work to all general practitioners. In this volume on obesity we have a sound readable monograph on the subject, written in a style peculiarly the author's own. Dr. Williams has succeeded in producing a volume suited to both the lay and the professional reader, scientific and logical in its

argument, and yet as easily read as the most recent "best seller." When we add that the word "caloric" does not occur once in its 166 pages, and that he believes that "physical exercise in woman, unless it be exhaustingly vigorous and long sustained, leads to an increased deposit of adipose tissue" we have said enough to indicate that it is a book those called on to treat obesity must read.

HEWAT'S EXAMINATION OF THE URINE AND OTHER CLINICAL SIDE-ROOM METHODS.—Revised by G. L. Malcolm-Smith, M.B., Ch.B., F.R.C.P. (Edin.). Seventh Edition. Edinburgh: E. & S. Livingston, 1926. Pp. 228. Price, 3s. net.

Dr. Hewat's handbook on the examination of urine and other clinical methods has always been a popular and useful book. Dr. Malcolm-Smith in bringing out the seventh edition of the book has taken care to maintain the main portion of the work, and has at the same time, thoroughly revised the text and added some of the modern techniques briefly. The book does not contain any elaborate methods of analysis but is suitable for those whose laboratory experience is limited. It should help students in learning some of the recent methods of laboratory analysis which are described simply in the book.

The main portion of this book deals with examination of the urine. The author has gone through the whole subject in a commendable manner. The book contains a lot of illustrations. A few new sections have been added to this edition, such as fractional gastric analysis, renal efficiency test, and examination of the cerebro-spinal fluid.

In the section of "the feces," the author has given short notes on the macroscopic, chemical and microscopical examination; but no mention has been made regarding intestinal parasites. A short illustrative section on some of the common intestinal parasites, worms and protozoa would not at all have been out of place and in our opinion would have enhanced the value of the book.

The book is of a convenient size and can be easily carried in the pocket. We recommend it as an useful book for ready reference.

J. P. B.

A PRIMER FOR DIABETIC PATIENTS.—By Russel M. Wilder, M.D. Third Edition. London and Philadelphia: W. B. Saunders Company, Limited, 1927. Pp. 134. Illustrated. Price, 7s. 6d. net.

In any disease, the faithful and intelligent co-operation between the patient and his doctor is needed most, it is in diabetes, and the author must be congratulated on bringing out a primer for the use of such patients. With the help of this book, it is hoped, they will be able to understand the rationale of the treatment, without which successful treatment of diabetes is almost impossible.

It may be argued that a little knowledge is dangerous. It often is, it is true; but the idea of the author in writing this book seems to be quite different. He has not intended the book to be used as a sort of "Family Physician" for self-treatment. In a disease like diabetes, if the patient takes up treatment in his own hand without any medical advice the result may be disastrous.

The book contains a lot of useful information:—food scales; caloric value and composition of foods; how to determine the tolerance; diet; prescriptions; insulin and its use; complications and their treatment, etc.; dealt with in simple language which may also help the busy general practitioner, who usually has no time to go through bigger and more elaborate treatises on the subject.

We have no hesitation in recommending the book to those for whom it is intended and also to the busy general practitioner for ready reference.

J. P. B.

Annual Reports.

ANNUAL REPORT OF THE KING EDWARD VII SANATORIUM, BHOWALI, U. P. FOR 1926. BY CAPTAIN R. K. KACKER, I.M.S. (PUNJAB). T.D.D. (WALES), LATE I.M.S., MEDICAL SUPERINTENDENT.

We are glad to receive this report, for it shows what excellent work is being done at Bhowali under the able direction of Captain Kacker. The Sanatorium is run by a trust committee, consisting of official and nominated members, and of non-official members elected by the U. P. Legislative Council. Its income is derived partly from government grants, but in almost equal measure from fees from patients, subscriptions and donations, and interest on capital. Remarks made by the I. G. C. H. and by Colonel Sprawson, I.M.S., in the visitors' book during the year show how much the work of the Sanatorium is appreciated in the Provinces. The report is illustrated with beautiful photographs, showing the beautiful mountain setting of the Sanatorium, the very attractive type of open air cottages provided, and the character of the buildings.

The accommodation at the Sanatorium is at present 74 beds, but it is hoped to raise it to 84 during the current year. A need which has been felt for a long time was the construction of a separate administrative block; thanks to a government grant the construction of the building has now been started. A point which will interest other medical superintendents in India is that the Sanatorium Committee has decided that all building work shall be carried out, not under the P. W. D., but by direct contract with the contractors, under the supervision of Mr. J. D. Grant, A.M.I.E., who has been appointed Consulting Engineer to the Sanatorium. The Superintendent reports that, although this involves extra work for him, "the system certainly makes for economy, expedition, and smooth working."

During the year a special grant was made for an x-ray apparatus, the need for which was very urgent, especially in connection with artificial pneumothorax treatment. In the first place, a small portable apparatus is being purchased; but later, if an electric supply can be obtained from the Naini Tal hydro-electric supply, a larger plant will be installed. A second step forward has been the appointment of a well qualified Assistant Superintendent, Y. G. Shrikhande, M.B., B.S. (Lucknow), B.Sc. (Allahabad), who is well qualified in laboratory and bacteriological work, and who—it is interesting to note—is himself an ex-patient of the Sanatorium. During the year three medical men applied for permission to work as honorary workers at the Sanatorium in order to "acquire merit," and permission was granted. It is intended in the future to organise regular classes for the special training of medical men who are either deputed by government or anxious as volunteers to learn modern methods of diagnosis and treatment. Of the urgent needs of the Sanatorium Captain Kacker writes very strongly; the first necessity is to raise the accommodation to beds for 100 patients, since at present two patients are turned away for every one admitted; the second urgent need is the provision of a nursing block for such patients as are seriously ill, require nursing, and who cannot be properly looked after in the cottages; the third urgent need is for the supply of electric current.

Turning to the more specific report for the year, no less than 490 persons applied for admission during the year, of whom only 275 furnished the full information required by the prescribed forms; and the Superintendent draws special attention to the rules for admission which are clearly set out in an appendix to the report. There are certain classes of patients who should not be sent to such a sanatorium in the hills; the destitute; acute febrile cases; patients with cardiac or renal complications, and others. In this matter there rests a real responsibility on the medical profession in India, for the accommodation is so severely limited that only suitable patients

can be admitted if the best use is made of the Sanatorium. In all 136 patients were admitted for treatment during the year, and more than 36 per cent. of them came from outside the United Provinces. In the table of occupations the special incidence of pulmonary tuberculosis among clerks and students is noteworthy; also the table of age incidence, which shows that in India the chief stress of the disease falls upon adults of from 20 to 40 years of life. No less than 51 per cent. of patients admitted were cases in stage III, and these advanced cases are in reality unsuitable for sanatorium treatment.

The average period of stay in the Sanatorium works out at 118 days, and considering that 92 per cent. of patients showed tubercle bacilli present in the sputum on admission, this must be considered a very satisfactory figure. The regime prescribed in the Sanatorium is the usual one of rest—both physical and mental—and graduated exercises, and Captain Kacker reports that he hopes to supplement the latter by occupational therapy, as patients who are on the road to recovery are apt to find time hang heavy on their hands. Where such measures do not induce a satisfactory response, recourse is had to special measures.

Of these, antiseptic inhalations are of appreciable value. Tuberculin, B. E. has been used on a certain number of cases, but has produced no striking results. Sodium morrhuate has been completely disappointing. Sano-crysin has been tried on four cases, but this line of treatment had to be abandoned in three of them owing to febrile reactions; in the fourth case it seemed to be of value.

Artificial pneumothorax was tried in 26 cases, although this line of treatment was particularly handicapped by the want of x-ray apparatus. In 14 of these cases the results were very good, whilst the only complications observed were a tendency to faintness owing to pleural shock in one patient, and febrile reactions in 4 cases—possibly owing to impurity in the novocaine solution employed. The laboratory work increased greatly during the year, owing to the appointment of a fully qualified Assistant Superintendent, and routine examinations of urine and faeces were made in all patients, and the albumin reaction of the sputum tested in doubtful cases. The blood sedimentation test is under trial.

The total income for the year was Rs. 88,851—including a special donation Rs. 15,000 from Mr. C. F. Sassoon,—and the expenditure Rs. 52,851; leaving a balance of Rs. 36,000.

The annual reports of the Madanappelle and of the Bhowali Sanatoria show that a beginning at least has been made of tackling the terrible problem of pulmonary tuberculosis in India. As Dr. Fridtjof Möller has pointed out in our columns, the policy of tuberculosis dispensaries in the large cities of India will lead nowhere unless there are available sanatoria to which selected patients can be sent. The tuberculosis dispensary should serve as a clearing station for cases, selecting those suitable for sanatorium treatment, and rejecting others. Pulmonary tuberculosis in India, perhaps the third or fourth of the seven scourges of India, can only be controlled by proper methods of town planning and rebuilding; and it is a problem of Indian cities and not of the Indian countryside.

Captain Kacker is to be congratulated on a most interesting report of a most valuable year's work.

REPORT OF THE HEALTH OFFICER OF CALCUTTA FOR 1925. BY DR. T. N. MAJUMDAR, D.P.H., D.T.M., F.C.S. (LOND.), F.R.S. (EDIN.). CALCUTTA: PRINTED AT THE CORPORATION PRESS. 1927.

CITIES are an expression of the herd instinct in man, and in the congregations of men there is opportunity for much evil and much good. Up to the time of Chadwick and Sir John Simon most cities had been dens of filth and disease. "Carpe diem" was the

motto of most city dwellers, for life was very uncertain. It was these two pioneers of common sense sanitation who showed that by intelligent application of the knowledge of the causation of disease, by a pooling of common resources and wealth, conditions in cities could be made much better and safer than in the country. The continued application of these principles has resulted in an immense improvement in the cities of England. London for instance has one of the lowest death rates of the Empire, and speaking generally the sanitary conditions of the English towns are far better than in the rural districts.

Over 80 per cent. of India's population still lives in villages and small communities, but there is evidence that urbanization is increasing. The health and sanitary conditions of India's large cities are therefore matters on which the attention of the whole country is focussed, being as they are an index of sanitary progress. Sanitation should be able to achieve in the cities of India the improvement which has been shown to be possible elsewhere.

The health of Calcutta, India's largest city, is thus a matter of national importance. Can we discern in its yearly reports any evidence of that improvement which the optimists and well wishers of India hope will soon begin to spread over the land?

At first sight there is a feeling of disappointment. Out of a population of 1,077,264, there were in 1925, 35,195 deaths, giving a death rate of 32.7 per mille.

The birth rate was 18.9. 3,923 lives were lost from small-pox, a death rate of 3.6 per 1,000; nearly 1,000 people died of cholera, and 1,586 from tuberculosis, a death rate of 2.4 per 1,000.

The infant mortality rate was 326 per 1,000 births. These figures are not cheering. It would take more space than is available to attempt to scrutinise all the causes and factors that hinder Calcutta's sanitary progress. Climate no doubt is a big factor; centuries of comparative poverty and yearly visitations of tropical epidemics have engendered in the population a feeling of callousness towards life and death, and "Karma" is at once a consolation and an opiate. The wish for life is not strong enough to put into practice the knowledge that in these days should be obtainable.

Dr. Majumdar gives a very interesting curve of the total mortality for 20 years. From 1906 to 1917 the death rate fell steadily from 37 to 23.5. Then came the disastrous influenza epidemic from which the city recovered in 1923. Since the latter date, however, the death rate has shown a disquieting steady rise for which there seems no adequate reason save increase of disease.

Dr. Majumdar also gives a very interesting analysis of the city's health. The "added areas" have increased Calcutta's responsibilities, but have not added to its health. These areas are more malarious, and have a higher death rate than the old Calcutta. A very instructive map on page 3 shows the death rate by wards: Buntally has a death rate of 66.4 and Watgunge 62.6, Beniapur and Satpukur 46.8 and 46.3 respectively; pretty high figures these! The causes given are child mortality, poverty, poor housing, deficient drainage, defective water-supply and ill cared for service privies. Can the city afford to improve the conditions in these bustee areas? Would the return in health be commensurate with the expense? Would the benefits be lasting? There is a table on pages 3 and 4 which gives one to think, a table of the causes of death in Calcutta in 1925.

Small-pox easily heads the list, then come respiratory diseases, then tuberculosis and, high on the list comes (unexpectedly), old age! Perhaps soon one of our Calcutta Ciceros may write a "De Senectute Calcuttiense." Next comes, as if in mockery, premature birth and congenital debility, then malaria and dysentery. Tetanus kills 1,161 people in Calcutta in the year, more than diarrhoea and enteritis.

Bernard Shaw in "Back to Methuselah" says that the average man is a coward and doesn't wish to live

beyond 70. There is a great deal in this. The desire to live long and to make the most of that life is not strong enough in India. Life is too cheap to be taken so much care of. Until we get a change in this point of view, public health measures are going to avail little. The high infantile mortality, 326 per 1,000 is but another expression of the cheapness at which life is valued by the population in general. Syphilis is stated to be the cause of a large proportion of premature births, and tetanus kills more than a half of those babies who die between a week and a month old. The Corporation Health Department does excellent work amongst poor women and children, though it is too early yet to measure benefits by figures.

There are twice as many males as females in Calcutta, which results in a comparatively low birth rate. It is distressing to read that there are 20,000 prostitutes in Calcutta.

Cholera in 1925 accounted for 0.92 per 1,000 deaths. From the mortality graph however it is hoped that cholera is on the downgrade. The recent propaganda work in inoculation should help towards a farther reduction, if pushed consistently and constantly. Cholera is mainly a disease of Hindus in Calcutta, and confined to the riparian and water-logged wards. Small-pox appeared in epidemic form; out of 3,304 deaths 435 occurred amongst children under 1 year and 899 in children from 1 to 5. Primary vaccination is therefore much neglected. The Vaccination Act of Bengal is too cumbersome in application and needs revision.

Malaria, if figures be true, killed more persons in Calcutta in 1925 than cholera, the death rate being 1.6 per 1,000.

Anopheles stephensi form about 1 per cent. of the anopheles in the malarious districts. Mahomedans suffer four times as much as Hindus from malaria in Calcutta.

Diarrhoeal diseases are common and where conditions of sewerage, water-supply and latrines are defective should be capable of immediate reduction by improving these.

Tuberculosis kills 2.4 of every 1,000 yearly and would appear to be on the increase. The returns are practically all *Phthisis*. The age and sex incidence is pitiable, the death rate in females between 15 and 30 is 6.5 per 1,000, a terrible condition of affairs. Dr. Majumdar cites early marriage as the most important factor.

Respiratory diseases are a large factor in Calcutta, mortality due to them accounting for 6.5 per 1,000.

Kala-azar is apparently increasing, even when allowances are made for the large numbers of cases that come for treatment from outside.

In section III Dr. Majumdar gives an excellent account of the activities of his department. Abatement of nuisances and the improvement of insanitary buildings form the bedrock of environmental improvement: 6,099 notices were issued as compared with 5,601 in 1924. The improvement of insanitary areas is closely linked up with the work of the Calcutta Improvement Trust which has demolished many such areas, but as Dr. Majumdar points out new construction has not been commensurate with demolition, and this very important factor in the prevention of slum areas must be very carefully watched both by the Corporation and the Trust. The Trust scheme for the Anglo-Indian classes and for the poorer classes in Ward Institution Street have been successful, but a scheme to the North for middle class Indians has not proved successful.

Food inspection and the prevention of adulteration are very important duties of the Health Staff. Under the 1923 Act a special sub-committee reported on the standards of purity of certain foodstuffs to be prescribed under the Act. The milk supply is a very difficult problem and no less an important one, as under modern conditions of life the growth factors necessary for infant, child and adolescent growth are difficult

to obtain from any other source. It is not surprising then that the Corporation should encourage the development of a better milk supply. While larger schemes are under consideration the Corporation meanwhile subsidises the Co-operative Milk Society's Union which guarantees to produce 500 out of the 4,000 maunds of milk daily used in Calcutta.

The Corporation undertakes a considerable amount of medical relief, and endeavours to pay special attention to malaria, kala-azar, and phthisis. A pleasing feature is the increasing use being made of maternity homes and child welfare centres. 4,748 maternity cases were attended by Corporation midwives, i.e., 2 per cent. of the total registered births of Calcutta. Only 13 maternal deaths occurred in these, a very much smaller proportion than happens without such aid. The Corporation Laboratory shows an excellent record of work during the year. Dr. Majumdar discusses the necessity of chlorination of the filtered water-supply at its source. There is no doubt that the quality of the filtered water deteriorates during the rainy season and Dr. Majumdar considers that chlorination during that period would be an additional safeguard.

Dr. Majumdar in his interesting report shows that he has a clear conception of the sanitary conditions of Calcutta and of the city's necessities. Sanitary progress, however, depends on many other factors than a health staff. We wish Dr. Majumdar and his staff every success in their strenuous efforts.

A. D. S.

ANNUAL ADMINISTRATION REPORT OF THE ASANSOL MINES BOARD OF HEALTH, FOR THE YEAR 1925-26.

THE Asansol Mines Board of Health is one of the few "ad hoc" sanitary authorities in India and its reports are of considerable importance in demonstrating what can be done by an authority furnished with the necessary legal powers and with adequate funds and a well organised staff, in combating infectious and epidemic disease and in improving environmental conditions generally. In appendix F, is given a comparison of death rates and birth rates, etc., between Asansol Mining Settlement and the cities of Calcutta, Howrah, and Dacca. The death rate of the Settlement was 16.11 as compared with 33.43 for Calcutta, the birth rates being 28.87 and 17.32 respectively. The purpose of the comparison is not quite apparent, as the age and sex compositions of the Settlement and these towns are quite different, and the vital statistics not therefore comparable without considerable adjustment. A better comparison would be with some of the surrounding parts of Asansol sub-division not in the Settlement, or adjacent parts of Burdwan or Bihar.

On page 9 is an instructive table showing how since 1920 the deaths in the settlement have decreased from 8,597 to 5,544 in 1926 and the births increased from 8,669 to 9,945, the "natural increase" having gone up from 72 to 4,401. Cholera and small-pox are the *bête noirs* of this area and much of the organisation is directed towards the prevention and spread of these diseases. In the spring of 1926 a serious small-pox epidemic threatened which was held in check by wholesale vaccination and revaccination. 1,129 cases occurred, 336 in unprotected persons with a mortality of 15.5 per cent., compared with a mortality of 9.3 per cent. in cases previously protected. 415 cases of cholera occurred with 206 deaths, giving a death rate of 0.63 per 1,000 and a mortality rate of 50 per cent.

Important research work carried out by Dr. Tomb and Captain Maitra, I.M.S., has been reported in the *Indian Journal of Medical Research* and *The Indian Medical Gazette*. Malaria and plague were negligible as causes of mortality. The infantile mortality rate was 120 per 1,000 registered births, and compares favourably with anywhere in India. The water-supply has been improved by twelve additional wells. A feature of the Board's work has been the education

of school children in health matters and the medical inspection of school children.

The organisation of the Board is thorough and complete and the chief sanitary officer is to be congratulated on another year's excellent sanitary progress.

A. D. S.

HEALTH DEPARTMENT. CIVIL AND MILITARY STATION, BANGALORE. ADMINISTRATION REPORT FOR 1925-26. BY S. AMRITARAJ, HEALTH OFFICER, BANGALORE.

THE civil station of the Bangalore has an all-time Health Officer, Dr. Amritaraj, who submits an interesting report on the year's sanitary happenings. There are nearly 120,000 inhabitants in the civil station, the majority being Hindus.

The birth rate was 39 and the death rate 30 per mille, the infantile mortality rate being 214. These are lower rates than the previous year, especially noticeable being the fall in the infantile mortality rate from 273 to 214. Child Welfare and Maternity Work is taken up vigorously and Dr. Agnes Scott in an inspection note made very complimentary remarks. Lung diseases show by far the highest mortality, bowel complaints coming next. Other diseases such as malaria, enteric, small-pox, etc., contributed only in a small measure to the total mortality. There were no cases of indigenous plague. 19,000 rats were destroyed, some of which were plague infected. Inoculations were carried out in the areas indicating the presence of rat plague.

Careful inspection and control are maintained over *dhobi* ghats, private and public markets, and slaughter-houses. The filtered water-supply is scanty and many wells had to be reopened. Careful and systematic disinfection of these was successful in preventing completely any outbreak of water-borne disease.

The report bears evidence of careful, systematic and consistent good work and we wish Dr. Amritaraj and his staff success in their efforts.

A. D. S.

ANNUAL REPORT OF THE EXECUTIVE HEALTH OFFICER OF THE CITY OF BOMBAY FOR 1926. BOMBAY TIMES PRESS.

COMMON sense and experience are the best interpreters of vital statistics. They are necessary, for at first glance we might draw very adverse conclusions from the figures of Bombay; its death rate in 1926 was 25, its birth rate 16.47 per mille, and the infantile mortality rate 390 out of every 1000 children born. We might be apt to say that at this rate Bombay would shortly cease to have any inhabitants at all. But the Health Officer explains that a great proportion of the women of Bombay go to their homes for their confinements and in a few weeks come back with the newly born children to Bombay. These births are not registered in Bombay, but the infant deaths are. The birth rate and the infantile mortality rate do not therefore represent the real state of affairs. Cholera was negligible in 1926, only 5 deaths occurring; small-pox accounted for 480 deaths, 0.37 per mille; and tuberculosis for 1,755 deaths or 1.37 per mille.

It is to the large cities in India that we should look for a lead in sanitary matters. The Bombay report contains matters of considerable interest, but does not particularly arouse optimism that Bombay is on the way to the realisation of great sanitary hopes. The infantile mortality rate, corrected for registrations outside Bombay, still has a figure of 255. Malaria is probably the added factor giving this high mortality. Captain Chalam, I. M. S. reports that out of 36 children under 2 living in railway quarters, one in every 3 had an enlarged spleen, and one in every 6 showed malarial

parasites in the blood. Much is being done by municipal nurses, midwives, maternity homes, milk depôts, etc., to correct the high infant death rates.

Plague is still endemic to Bombay, and 0.45 per cent. of rats examined (283,050) were infected.

Bombay has three anti-tuberculosis institutions, which appear to do good work.

Malaria is always a danger in Bombay and if things were left to themselves would soon be a very serious menace. The Back Bay Reclamation scheme was recognised to be dangerous and a special officer was deputed for anti-malarial work. Dr. Sandilands is of opinion that malaria is widely prevalent in the city.

Bombay consumes 3.1 ounces of milk per head per day. We are surprised to find that 78 per cent. of milk comes from milk stables in Bombay city. We had an idea that these stables had been abolished, and that up to date arrangements have been made to bring milk by cold storage trains from outside.

The water supply is still unfiltered, but the greater part is chlorinated throughout the year.

The interesting question of the sewage disposal is not discussed. It is of course more an engineering problem. The scheme for remodelling the whole system is still under consideration. One notes that the old "basket privies" are still dammed and still exist.

The housing problem of Bombay is a big one. 35,000 houses are inspected yearly by the health staff. Tenements or chawls are the favourite class of inferior house; of the total tenement population 66 per cent. live in one-roomed houses, and 56 per cent. of the total births in the city occur in these one-roomed families. No wonder the women wish to retire to the comparative quiet and privacy of their country homes to have their children.

The report is an interesting one and gives a record of much laborious work done by Dr. Sandilands and his staff.

A. D. S.

Correspondence.

PERSISTENT HICCUGH ASSOCIATED WITH ASCARIS INFECTION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—About five months ago, when I was in charge of the Local Fund Dispensary, Shirdahalia, I was called in to see a Hindu male patient, aged about 35 years, who had been suffering from persistent and most obstinate hiccough for a week. The attacks were so continuous and so severe that the patient felt himself half suffocated. Vomiting was also present, and the patient could retain no food. The patient informed me that seven or eight years previously he had had a similar attack, which lasted for ten days or so.

Physical examination of the patient showed no obvious cause for the condition, and he was a generally healthy individual, whilst the complaint had set in suddenly without previous warning or ill-health. I particularly enquired whether he had ever suffered from round-worm infection, but this he emphatically denied.

The usual lines of treatment, such as effervescent mixtures, blisters to the epigastrium, sedative drugs—such as bromides, chloral, and opium—were all tried, but failed to give any relief. Gastric lavage could not be attempted owing to the severity of the symptoms and the patient's sense of partial suffocation. Morphia was administered hypodermically at nights, but gave only partial relief; as soon as the patient woke up the condition recurred. It persisted for a fortnight, by which time the patient was bed-ridden, and owing to his inability to retain food, in a condition of great prostration.

As a last resort, I administered santonin and calomel, three repeated doses. The next day the patient

had two stools in which he passed about 20 full grown round-worms. The hiccough now gradually lessened and by the subsequent evening had completely ceased. Next morning he was given a mild purgative, when he again passed a further half dozen round-worms, numbering about two dozen in all. The symptoms immediately ceased and the patient is today in excellent health.—Yours, etc.,

K. M. HULI RAO, I.M. & S.

Assistant Surgeon.

LOCAL FUND DISPENSARY,
CHANNAPATIRA DISTRICT,
BANGALORE DISTRICT,
10th August, 1927.

ARTHRITIS AS A COMPLICATION OF SMALL-POX.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—With reference to Dr. Gopal Singh Chawal's letter in your issue for May, 1927, may I be permitted to say that septic arthritis is not an uncommon complication of small-pox? At the present moment I have under treatment a patient, a boy five years of age, who suffered from small-pox a month ago. As a result, he now has septic arthritis of both shoulders, knees and elbows. His shoulder joints are enormously swollen and discharging pus. I last saw him on the 11th August, when the suppuration had ceased, but had left the joints swollen and tender, and ankylosis is feared.—Yours, etc.,

BALKRISHNA N. MEHTA, M.B., B.S.

JUVANSINGJI DISPENSARY,
BHAVNAGAR.

14th August, 1927.

A CASE OF OSTEO-SARCOMA FOLLOWING SYPHILIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—Mr. N. O., a lawyer and an athlete, aged about 35 years, who had suffered from syphilis six years previously, consulted me for an inflammation on the upper and outer part of his right leg,—apparently due to periostitis.

This gradually developed into a very painful, hard swelling on the outer aspect, just below the knee joint. It continued to rapidly increase in size, to such an extent that it looked like a second knee, and the joint became fixed. He received Tibbi treatment, chiefly by the administration of strong purgatives every 3rd or 4th day; this caused many stools daily, and he became very weak.

From his history and the appearance of the swelling I thought the case to be one of gumma, but the gravity of his condition led me to advise a consultation and treatment at Lucknow. The civil surgeon there diagnosed osteo-sarcoma, and the leg was amputated through the lower third of the thigh. Subsequently infected lymphatic glands had to be removed on two occasions, and the patient was finally sent to Ranchi for radium treatment. Here he showed some signs of improvement for several days, but then died from sudden heart failure.—Yours, etc.,

M. ASLAM OMAR, I.M.P.

GONDA,
29th July, 1927.

SURGICAL WORK IN A MOFUSSIL DISPENSARY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—The days are past when Indian patients in the mofussil dreaded surgical operations. The reason is not far to seek. In the old days sepsis reigned supreme, and the vivid description of the old septic days at the Calcutta Medical College Hospital forty years ago, published by an old military medical student of that College in your issue for March, 1925, shows how unpropitious

was the introduction of modern surgery into India. But those days are gone, and surgical patients often have to wait for days or even weeks for admission to the Calcutta Medical College Hospital or the Belgatchia Hospital, Calcutta.

My purpose, however, is to show that much good surgical work is being done and is possible in the Indian countryside. After twenty years of experience in the rural areas of Bengal, I am of opinion that but very few of the surgical cases seen in municipal and outlying dispensaries go on to present themselves for operation at district headquarter hospitals. Having realised this fact, I began to admit surgical cases to the Dalgram Charitable Dispensary for major operations. Dalgram

is a small village, and the dispensary is of the most ordinary type, with very small funds for its maintenance. With the help of public subscriptions I got a separate shed erected for surgical work. My staff consists of one compounder and one servant, and in many instances I had to appeal to my brother practitioners for help. The furniture consisted of a wooden operation table, a small wooden table, a small sterilizer, a stove, and an iron kettle. Only lately has it been possible to add a combined instrument and dressing steriliser to the list. Boiling was the only method available for sterilising instruments and dressings. The following table shows the number of operations performed in this dispensary for the years 1919-1926, with this primitive equipment.

Operations at the Dalgram Charitable Dispensary. 1919-1926.

Nature of operation.	No.	Average number of days in the hospital.	Anæsthetic used; general or local.	Result.	REMARKS.
Excision of tumours of various kinds, including elephantoid scrotum.	71	16	Chloroform	Cured	
Inguinal hernia	1	20	"	"	
Ventral hernia	1	15	"	"	
Ovarian cyst	1	15	"	"	Weighting 8 lbs.
Cyst in the broad ligament	1	17	"	"	
Removal of ovary	1	10	"	"	
Removal of breast	2	12	"	"	For cancer.
Old rupture of perimetrium	1	10	"	"	Submitted to operation for prolapsus uteri
Hare lip	1	Outdoor	Codrenine	"	
Other plastic operations	10	"	4 Chloroform	"	
			6 Codrenine.		
Inperforate vagina	1	12	Chloroform	"	
Fistula-in-ano	9	22	"	"	
Excision of hæmorrhoids	1	10	Codrenine	"	
Circumcision	32	Outdoor	"	"	
Operation in abdomen for injury (prolapse of intestine and omentum).	1	"	Chloroform	"	After operation the girl was taken to her home which was close by.
Necrosis of bone	9	Outdoor	"	"	
Nasal polypus	4	"	None	"	
Amputations	12	20	Chloroform	"	
Thyroidectomy	1	13	Codrenine	"	About the size of an orange.
Hydrocele (radical)	30	8	Chloroform	"	
Removal of testis (single)	6	8	"	"	
Do (double)	1	15	"	"	
Abdominal cyst (retro-peritoneal)	1	21	"	"	
Enterorrhaphy	1	45	Apothesine	"	Rupture was "due to intestinal obstruction. The patient was in a hopeless condition but after all survived.
Complete excision of humerus	1	37	Chloroform	"	For osteomyelitis.
Instrumental treatment of compound fracture of ulna and radius.	1	0	"	Died	The patient was taken home after operation. Death due to tetanus.
Ditto tibia and fibula	1	32	"	Cured	
Cyst of conjunctiva	1	Outdoor	Cocaine	"	
Craniotomy	1	"	Chloroform	"	She was taken home after delivery.
Iliac abscess	15	25	"	"	
Do. burst into bladder	1	36	"	"	
Psoas abscess	1	Outdoor	"	"	
Retropharyngeal abscess	1	"	None	"	
Perirenal abscess	1	"	Chloroform	"	
Perirectal abscess	1	26	"	"	
Parametric abscess	1	30	"	"	
Appendicular abscess	2	28	"	"	
Abscess, subphrenic	1	12	"	"	
Abscesses in other parts of the body.	793	Outdoor	None	"	
Various other operations	591	"	"	"	
Total	1,602				

A study of the above table shows the possibilities for major surgical work in *mofussil* and outlying dispensaries. The patients have perforce to be nursed by their own relatives, and also to bear the entire cost of all diet and attendants. On the other hand there are many surgical patients who cannot afford this. In my opinion government should make provision in these outlying dispensaries for at least four surgical beds apiece, with the necessary provision for the dieting and nursing of indigent patients. Such patients will often refuse to go to the Sadar hospitals, where they are away from their relatives and friends.

A further matter in which improvement is needed is in obstetric work. There is no provision in these outlying dispensaries for emergency midwifery work, such as cases of eclampsia or of abnormal labour. So far as my experience goes, the Indian villager is not in any way adverse to modern medicine, but he asks for it to be brought to his door. He will not travel to distant headquarter hospitals or to big cities in search of surgical and obstetric aid.—Yours, etc.,

AMULYA KUMAR BHATTACHARYA, L.M.P.

DALGRAM CHARITABLE DISPENSARY,

TUSHIHANDER, RANGPUR

DISTRICT.

24th July, 1927.

INFANTILE CIRRHOSIS OF THE LIVER AND RICKETS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—In reply to the question raised by Dr. L. R. Narayana Iyer on p. 175 of your issue for March 1927 with regard to my article on infantile cirrhosis of the liver, I write to say that no *post-mortem* examinations could be carried out on the cases, owing to the refusal of the parents—even of those of educated class—to permit this. Some very early cases of infantile cirrhosis of the liver might possibly be mistaken for rickets, but such early cases are never brought for treatment, as the doctor is usually only consulted when the disease is so far advanced that the parents are nervous as to its final result. Several of the local cases here have been seen by civil surgeons, who are of opinion that, if one has once seen one—or, anyhow, half a dozen—cases of infantile cirrhosis of the liver, there is no possibility of confusing it with rickets.—Yours, etc.

A. S. VAIDYANATHA IYER.

TELLICHERRY,

16th August, 1927.

A CASE FOR DIAGNOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—On the 14th June, 1927, I was called in urgently to see a patient living 8 miles from our dispensary, who was seriously ill. The history given was that he had been suffering from slow irregular fever and continued diarrhoea, without blood or mucus in the stools for about a month. Ginger, *asafoetida*, and other home remedies had been used and the diarrhoea had subsided. When it subsided, however, to his surprise he began to develop a generalised puffy swelling, accompanied by severe dyspnoea.

On examination, I found him to be a fairly well-built patient of about 20 years of age, of labouring class. The temperature was 97.6°F., the pulse soft but regular and 132 per minute; the respirations 67 per minute, accompanied by severe dyspnoea, for which the patient was propped up in bed. He could speak only with difficulty, and had a dry cough. With regard to the swelling of the subcutaneous tissues, it had commenced in the head and had immediately spread to the face, neck, chest, upper extremities, back, and genitalia, but the lower extremities were absolutely free from oedema. The skin over the swollen areas was glistening, and on pressure on to it typical crackling crepitus was elicited, in all areas. The oedema was of elastic

type, the skin resuming its former level when the pressure of the finger was released.

I at once thought of surgical emphysema and examined the heart and lungs. The lungs were resonant everywhere and the cardiac dulness was markedly impaired, in fact almost absent. On auscultation deep moist rales were heard everywhere all over the chest, and I could not hear the normal breath and heart sounds. Thinking the case to be one of surgical emphysema, I searched for any external wound on the body, but could find none at all. Nor could I get any history of injury to the chest or lungs or pleura. In brief, I could find no cause at all for the condition present.

Treatment therefore was symptomatic, calcium lactate powders being administered in large doses. The bowels were readily opened by saline aperients. The patient remained under my treatment for three days, but died on the 18th June. No *post-mortem* examination was allowed.

The case was a peculiar one; marked dyspnoea, entire absence of swelling from the lower extremities, and its onset with the termination of the one month's diarrhoea. I should be glad if any of your readers would make any suggestion.—Yours, etc.,

MAGANLAL D. LATTIGARA, M.B., B.S.

Medical Officer.

BHUKIA DISPENSARY,

KATHIAWAR,

22nd August, 1927.

COUGH IN CATARACT OPERATIONS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—The following method has proved very successful in operations on cataract patients who have coughs, and is advocated by Mr. Chawan, the Blind Relief Association's Medical Officer at Chalisgaon, East Khandeshi.

Five minims of adrenalin solution are given subcutaneously before operation; or 10 minims of the same solution orally. This stops the cough for twenty-four hours and allows the operation to be performed safely. It can be repeated if necessary the next day and on following days.—Yours, etc.,

A. R. BHAT,

Chairman, Blind Relief Association.

MIRPURKHAR,

8th November, 1927.

A CASE OF SEXUAL PERVERSION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—Although the occurrence of some form of sexual perversion in neurotics is a well-established fact, the following case is, I think, sufficiently foreign to the ordinary run as to warrant publication.

A patient, an Anglo-Indian male, aged 28, consulted me recently for "nervousness." Following my usual practice, I pressed him to tell me what he considered to be the cause of his illness. After some hesitation, he told me that he attributed the onset of his trouble to having inserted the horn of a rhinoceros, (presumably *R. bicornis*, as he was at that time residing in Tanganyika Colony), into his anus in order to elicit an orgasm. The insertion of foreign bodies into the anus to evoke or increase sexual feeling is, of course, by no means an uncommon procedure, but the employment of the horn of a rhinoceros to this end must be, I fancy, somewhat exceptional. Perhaps readers of the *Gazette* in parts of India or Assam where rhinoceros still abound, could throw further light on this point?—Yours, etc.,

OWEN BERKELEY-HILL,

Lieut.-Colonel, I.M.S.

RANCHI EUROPEAN MENTAL HOSPITAL,

KANKE P. O., RANCHI.

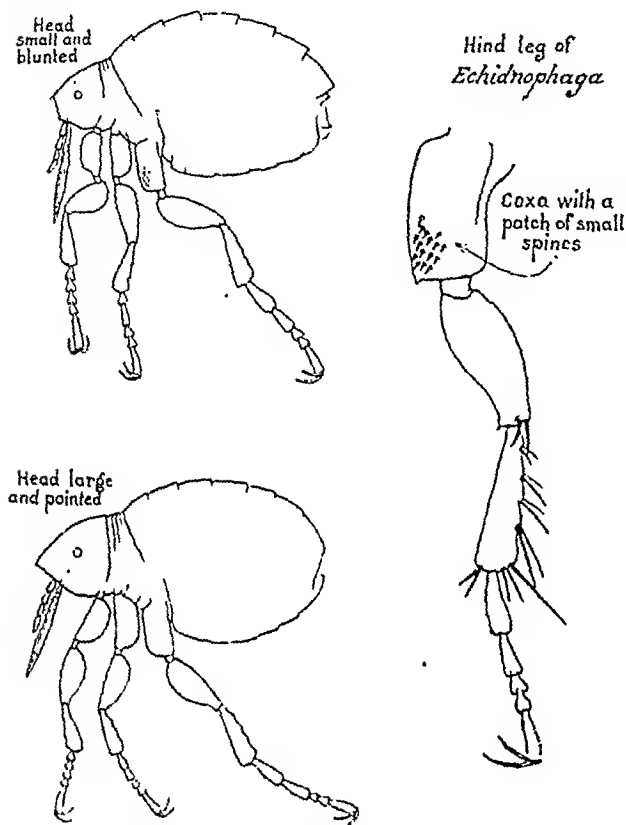
12th November, 1927.

A CASE OF SWEATING BLOOD.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The case under the above heading communicated by Lieutenant-Colonel Kelsall, I.M.S., in the October issue of the Gazette, is of considerable interest for the reason that it is, I believe, the first instance reported in this country, of the fowl-flea attacking the human host.

This fowl-flea, *Echidnophaga (Sarcopsylla) gallinaceus*, appears to be widely distributed in India, and is met with in poultry-runs and also, often in large

ECHIDNOPHAGA GALLINACEUS*DERMATOPHILUS PENETRANS*

D.A. Turkhud del.

numbers, in the living rooms where fowls are kept, especially when such places are not regularly lime-washed or treated with pulicidal remedies. These fleas can be trapped in the usual manner by letting a guinea-pig loose in the infected place, and are afterwards collected from the animal by chloroforming it.

So far as I am aware, the jigger-flea, *Dermatophilus (Sarcopsylla) penetrans*, has not yet been reported as endemic in any part of India.

Echidnophaga gallinaceus is likely to be mistaken for *Dermatophilus penetrans*. The thoracic segments are compressed in both, but the *Echidnophaga* can be very easily recognized by the presence of a patch of a number of short spines on the coxa of the hind leg; this distinctive feature is absent in the *Dermatophilus*. Moreover, in the former flea the head is small and blunted, while in the latter, it is large and pointed anteriorly.

The accompanying drawings may be found helpful in distinguishing them. The characteristic patch of spines in the *Echidnophaga* can be very readily seen under 16 in. objective; its exact position is shown in the magnified picture of the hind leg.—Yours, etc.,

D. A. TURKHUDD, M.B., C.M. (Edin.).

"IFFLEY,"

KODAIKANAL, S. I.
3rd November, 1927.

PLASMOQUINE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have read with great interest the paper of Messrs. Fletcher and Kanagarayer, entitled "Plasmoquine in the Treatment of Malaria" in the September issue of your journal.

As I am in charge of the Medical Department of Messrs. Haverro Trading Co., Ltd., who are the sole importers of "Plasmoquine" into India, Burma and Ceylon, I would like, however, on behalf of the manufacturers, to make a short remark on the statement of the authors on p. 503.

"The tablets made as they are at present are unsuitable for use in the damp tropical climate; no sooner is the stopper of the bottle opened than their sugar-coating melts and they run together into a sticky mass."

These tablets received by the authors belong to the first output which were designed for trial work in Spain, Italy and the Balkan countries. But as the demand for trial quantities from the tropical countries also very soon arose we had to send the above mentioned sugar-coated tablets called "dragees" in order to avoid a delay in spite of the fact that we doubted their resistance to the tropical climate.

After all we are glad to inform the medical profession that the tablets of "Plasmoquine compound" now available on the market are prepared in a different way and are no more sugar-coated. They are especially made for tropical conditions and stand any climate. We hope that "Plasmoquine" in its present form which is according to the authors "a long step towards the realization of a great ideal" will soon show the beneficial results on the malaria-stricken plains of India.—Yours, etc.,

O. URCHS, M.D. (Prague).

15, CLIVE STREET, CALCUTTA.
30th September, 1927.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel W. H. C. Forster, M.B., I.M.S., Director of Public Health, Punjab, is appointed to be Inspector-General of Civil Hospitals, Burma, with effect from the date on which he assumes charge of his duties.

Lieutenant-Colonel F. Stevenson, I.M.S., an Agency Surgeon, is posted as Residency Surgeon, Kashmir, with effect from the 15th October 1927.

Major J. R. D. Webb, O.B.E., D.P.H., I.M.S., Health Officer, Simla, is placed on Foreign Service under the Indian Research Fund Association, with effect from 1st November 1927 and up to the 28th February 1928 for employment as Officer on Special Duty in connection with the 7th Congress of the Far Eastern Association of Tropical Medicine and the League of Nations Interchange of Health Officers.

Major C. M. Ganapathy, M.C., D.P.H., I.M.S., Assistant Director-General, Indian Medical Service, is appointed to act as Health Officer, Simla, with effect from the 1st November 1927 and until further orders.

The services of Captain B. S. Dhondy, I.M.S., are placed temporarily at the disposal of the Government of the United Provinces for employment in the Jail Department with effect from the date on which he assumes charge of his duties.

The services of Captain R. N. Bhandari, M.D., I.M.S., are placed temporarily at the disposal of the Government of the Punjab with effect from the date on which he assumes charge of his civil duties.

PROMOTIONS.

Major to be Lieutenant-Colonel.
J. A. Shorten, M.B. Dated 11th September 1927.

Captains to be Majors.

R. C. Phelps, M.B. Dated 28th October 1927.

B. S. Dhondy, M.B. Dated 28th October 1927.

Major (now Lieutenant-Colonel) W. M. Anderson, C.I.E., M.B., I.M.S., is granted the acting rank of Lieutenant-Colonel from 7th December 1916 to 14th October 1919 whilst serving with the Mesopotamian Expeditionary Force.

The promotion of Major R. Hay, M.B., notified in Army Department Notification No. 1334, dated the 22nd October 1926 is antedated from the 7th October 1926 to the 7th April 1926.

Lieutenant to be Captain.

G. Dockery, M.B. Dated 22nd February 1927.

RETIREMENTS.

Colonel A. N. Fleming, D.S.O., M.B., F.R.C.S.E., K.H.S., I.M.S., 8th September 1927.

Lieutenant-Colonel G. J. G. Young, M.B., I.M.S., 28th June 1927.

RESIGNATION.

Captain Subbier Annaswami. Dated 3rd October 1927.

NOTES.

CALCUTTA SCHOOL OF TROPICAL MEDICINE AND HYGIENE.

EXAMINATION RESULT. I.T.M.

Session. July—September, 1927.

Passed:—

1. Barkat Ram.
2. Sitanath Basak.
3. Vithal Raghunath Baxy.
4. Subodh Chandra Bhattacharji.
5. Probhat Ranjan Borat.
6. Nares Chandra Bose.
7. Dwijendra Nath Chakraverty.
8. Nepal Chandra Dey.
9. Dharendra Kumar Dutta.
10. Pramatha Nath Guha.
11. Prakriti Bhushan Gupta.
12. Ajantada Wthaya Kalaya.
13. Chaman Lal.
14. Kunwar Behari Lal.
15. Bhuban Mohan Paul.
16. Saravanamuttu Solomon Rajanayagam.
17. S. G. Audinarayana Raju.
18. Y. Suryanarayana Row.
19. Kishorilal Sarma.
20. Komanduri Seshachari.
21. Ram Narayan Sharma.
22. Bhupesh Chandra Sinha Roy.
23. Jethmall Vyas.

TO WHOM IT MAY CONCERN.

As our readers know, the relaxation of the regulations with regard to compulsory inoculation of infants against small-pox in the United Kingdom have been followed by a general recrudescence of the disease. At present it is of mild type, but there is no guarantee that this state of affairs will continue. In India relaxation of control is immediately—and almost inevitably—followed by severe outbreaks.

Under these circumstances the Voluntary Service Fund (Small-pox Clearance) has been formed at Home—(address: 36, Friday Street, London, E. C. 4)—to make the truth about vaccination against small-pox known to the general public. Up to date this Fund has published seven small manuals or pamphlets for general distribution; one dealing with the diagnosis of small-pox, another with its administrative control, a third with notes for medical practitioners on the disease,

a fourth summarising the general position at present in the United Kingdom, a fifth with facts for popular information, and a sixth with differential diagnosis. The seventh, and latest publication, is a small brochure with the above title, published at 1s. 8d.

To Whom It May Concern is by Dr. Wanklyn, and it is a general statement of the position with regard to small-pox and vaccination. "Our duty" he writes, "is to free ourselves from this pest. We must be absolutely and entirely quit of it once and for all. This cannot be done without general education and understanding; in that way it can be easily done. It is intended that this book shall take its place as a further contribution in support of the small-pox clearance campaign, which, under Providence, is steadily growing in volume and power throughout this country and the British Empire."

Those of our readers who are concerned in public health work may be interested to hear of this brochure, and of the existence of the Voluntary Service Fund.

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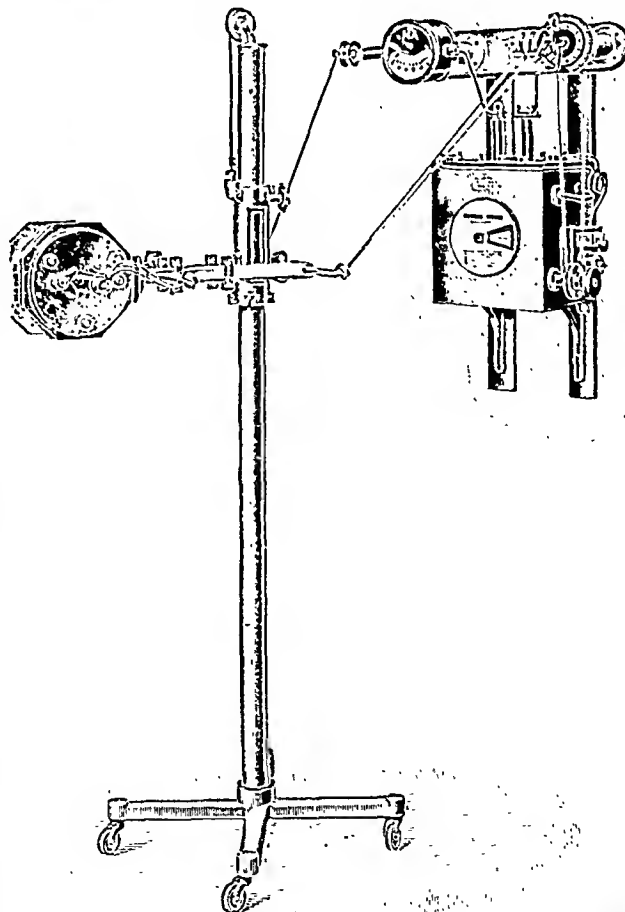
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A NOTE ON INDIAN MEDICINE.

By the late Sir CLIFFORD ALLBUTT, M.A., M.D.,
F.R.C.P., F.R.S.

(Note.—The following note on Indian Indigenous Medicine was written by Sir Clifford Allbutt in 1922, and was given by him to Sir Norman Walker. The latter made it over to Lieut.-Col. H. R. Dutton, M.R.C.P. (Lond.), I.M.S., Principal, Patna Medical College, who forwarded it to us. It is published with the very kind consent of Lady Allbutt. We think that our readers will be interested in Sir Clifford Allbutt's estimate of the ancient systems of Medicine in India.—EDITOR, I. M. G.).

THE Medicine of India has a history and a character of its own; whatever its worth it has been no mere reflection of Medicine elsewhere. If loaded with superstition and fable more heavily than the Medicine of some other countries it is so far in accordance with oriental habits of mind. On the other hand it contained much empirical knowledge which served a temporary purpose, and a plentiful collection of remedial agents, especially of medicinal plants derived from the rich flora of the land. Moreover, it had a surgery of its own which, tried even by a Western standard, was by no means contemptible. Unfortunately after its bloom it made little further growth, being confined in the hard shell of caste and tradition. Nevertheless by the missionary efforts of Buddhism, and again later by the adoption of Indian Medicine by the Persians and Arabs, it obtained no little vogue both eastwards and westwards; but nowhere in the East did it reach the standard nor the influence it attained in its native land. From early times many remedies found their way from the Indian pharmacopœia to the collections of the West (e.g., Hippocrates, Dioscorides, Galen). It has been supposed that Indian Medicine owed almost its all to the incursion of Alexander and his successors; but, although no doubt thus a wedge of Western Medicine was driven into the stagnating Indian Medicine, the Alexandrian contribution, good as it was, made a relatively small addition to the bulk of the home product. Plastic surgery, which had so active a course in the Middle Ages in the West, took its origin or at any rate its development from the Indian methods. In both cases the technique owed its vogue to the same cause, to the penal amputations of nose or ears so frequently inflicted in the later Middle Ages in Europe also. Hypnotism and the practice of "suggestion" probably took their origin in India. Five hundred years before Christ, hospitals were founded in Ceylon, whence also came many of the medicinal plants, and three hundred years before our era the Buddhist King Asoka founded hospitals for both man and animals. It is to the rich source of

the Sanscrit literature that we owe our knowledge of the origin and development of Indian Medicine which, throughout its history and growth, was largely theurgic. It was chiefly to the strong progress of its surgery that much of the virility of Indian Medicine was derived. This is an instance the more of the benefits which in the past of all peoples medicine has owed to its surgical branch.

Indian Medicine may be divided into three periods: first the Vedic, extending down to the eighth century before Christ; the Brahmanic, during which time it was dominated by priestcraft; and thirdly, the Arabian period beginning from 1000 A.D. The Vedic period had no peculiar character, it consisted largely in religious hymns and scholastic exegesis founded upon them. In its origin, of course, it arose before or with the earliest Aryan folklore (Rigveda, Samaveda, Yajurveda, Athervaveda) and depended upon a natural polytheistic religion; but contained many non-Aryan elements and much fantasy. The medicine of the Athervaveda differed somewhat decisively from that of the earlier Vedas. It was more domestic, and in this respect, and in the innumerable godlings which presided over the various bodily functions, and demons which beset man from without, reminds the reader of the early stages of Medicine in Rome. This Veda and the Rigveda are of the chief importance for Medical History. Something also of primitive Pneumatism appears in this period; as the air (breath) was regarded as the vehicle of life force. The empirical knowledge, weighted as it was by a heavy theurgy, contained little of anatomy. In those times, as ever since in India, anatomy was quenched or checked by the intolerance of dissection; but it contained some very close observation of disease, and of poisoning; no little experience of the properties of medicinal plants, of water, both for bathing and drinking, of open air treatment, and some sound surgery. In the Athervaveda, the divine powers have given way to magic and to enchantments after the kind well known in Babylon, Egypt, etc., and other sorceries chiefly directed against disease demons. At this time the great bogie was "Takman," a malignant fever which was supposed to enter into a crowd of diseases; and for which the chief remedy was the *Sama* plant (perhaps the *Asclepias syriaca*) which, besides its direct virtues which were many, had a peculiar efficacy against disease demons. It is very interesting to see how in the midst of theurgic and magical medicine the physicians, at any rate in the later Vedic time, gradually took up an independent position, in a certain antagonism indeed to the Brahmans. Thus perhaps, we may find in Indian history some explanation of the obscure growth of the independence of Hippocratic Medicine, as distinguished from the priestly medicine of Greece.

In surgical cases incantations and the use of semi-mystic herbs were made use of. Nevertheless, many diseases were clearly distinguished

and fairly described; such as scrofula, phthisis, dropsy, epilepsy, gout, heart disease, jaundice, hemiplegia, skin diseases, sexual disorders, and so forth; and some were recognised as hereditary. In the Vedas also were prescriptions for abortion, aphrodisiacs, and like purposes.

In the Brahman period Medicine has received especial attention because it was the medicine of this time which passed almost unchanged into the tradition of the Arabs; moreover, a remarkable general resemblance appeared between this tradition and the medicine of the Greeks and in certain details also. So that the earlier Indian Medicine may justly claim an originality and flexibility of its own; and moreover, was therefore the most apt to assimilate both theoretical and practical knowledge from the more advanced medicine of the West. To this resemblance to Greek Medicine no little influence may be attributed to the invasion of Alexander and to the few following centuries of trade. But the theurgic incubus was too strong and gradually medicine and even surgery fell under its hardening and sterilising domination.

In the teaching methods were some good points, e.g., a teacher was allowed to take only four to six pupils, a lesson to us! The course extended over six years and was both clinical and theoretical (textbooks). It was a maxim of their schools that a theoretical education without instruction in practice is helpless at the bedside, while on the other hand, one who has had only a practical education without theory has not the ascendancy of the best physicians. For medicine, as for Brahmanic learning in general, Benares was the chief centre. For license to practice the permission of the King was required. One of their maxims was "When a man is ill the physician is his father; when he is cured, his friend; when restored to health, his protector."

On account of the sacredness of the animal body the initial instruction in surgery was curious—the student practised incisions on fruits, he inserted probes into any perforations available, passed needles through the skin of dead animals, and upon them drew teeth and pretended to bleed from their vessels. To such straits students are reduced when denied dissection and humane animal experiments. On the other hand the surgeon was ordered to cut his hair and nails short, to put on a white vestment and to keep his body clean. At the bedside, among other "manners" he was not to enter upon any other subject than the state of the patient, not to gossip about other things nor to pry into domestic affairs. Beyond his fee he was to seek no presents unless it were a little necessary food.

The triad chiefs of Indian Medicine were Charaka, Susruta, and Vagbhata. Charaka flourished about our era; Susruta in the 5th century after Christ; Vagbhata some two centuries later, but no doubt there was a great medical tradition in far earlier times. An im-

portant MSS. written on birch bark but in good preservation was discovered in 1890 by a Mr. Bower, and is known by his name; it is attributed to the middle of the 5th century after Christ. This MSS. gives much information concerning Charaka and Susruta. Another MSS. is extant also, known as the "Macartney." From these sources we perceive more clearly that the three eminent physicians were younger champions of a medicine which, as we have said, derived from an ancient tradition, its beginnings being lost in myth, but myth with a kernel of truth. Charaka is distinguished by a more copious setting forth of his knowledge, Susruta by a drier style but with a stronger leaning to surgery. Some important sections of these have been translated into English. Of Susruta, there is a complete, but very defective, translation into Latin (Eßler, Erlangen, 1844—1850, 3 Vols., and a commentary translated and published a little later).

Charaka's work consists of eight chapters; it deals with pharmacology, diet, certain descriptions of diseases, methods of cure, physiology and psychology, anatomy, general pathology, embryology, etc. There are eight sections on skin diseases. Susruta, as we have seen, dwells more on surgery. Vagbhata is in large measure a reproduction of Susruta. They all gave their allegiance to "Ayurveda"—i.e., "the Knowledge or Spirit of Life." All later Hindu medical writers occupied themselves with these earlier authors, reproducing them and overlaying them with elaborate commentaries and a few additional matters of subordinate value. In the 16th century such derivative works were many, but unfortunately in India there was no "Renaissance." Sacerdotal sanctions overshadowed all scientific progress and not only forbade dissection but regarded all dead bodies as under taboo. Therefore, Indian anatomy could not come into existence and nominally consisted in a mere enumeration of parts of the body, in which the magic numbers five and seven prevailed. Their physiology rested upon three elements or humours—air, phlegm, and bile—and in them consisted the processes of life. From them were formed chyle, blood, flesh, fat, bones, marrow, and semen. But in all and through all was the inspiration of the Life Spirit. In the perversion of the elements lay the causes of disease, confirmed, however, by natural causes such as climate, heredity, poisons, also by sin, demons, and so forth. Diseases were classified as outer, inner, local, general, curable or incurable, physical and psychical. Diagnosis depended upon very acute observation (they noticed that the dogs licked the urine of diabetics), and upon aphorisms. As in the school of Hippocrates, and in all active schools in which necropsy was forbidden, great stress was laid upon maxims of prognosis, not undiluted by priestly and magical elements. Great stress was laid upon hygiene and diet, daily cleanliness, including the teeth, attention to the excretions,

massage and rest cures, baths, clothing and so on.

Of drugs, we have seen there were a multitude. Charaka knew of 500 healing herbs, Susruta of 760; and it is to be remarked that the Indian physicians were before the Westerns to use, both externally and internally, various mineral remedies, including mercury (Susruta) and arsenic. They had a proverb "He who knows the virtues of herbs and roots is a man; of water and fire a spirit; of prayer a prophet; of quicksilver a god." Elixirs, cosmetics, aphrodisiacs, poisons, were only too well known.

It is evident even that surgery was the strong point of Indian therapeutics; the technique was elaborate, and by its speculative fancies were so far expelled. Minute care and cleanliness were compulsory. They had a numerous collection of instruments, including the magnet for drawing out metallic bodies. Anæsthesia was induced by strong drink. Operations had to be done under favourable constellations. The Indian surgeons were remarkably successful in laparotomies, cutting for stone, and plastic operations. The Cæsarian operation was done only on the dead; of turning methods they seem to have been ignorant.

STUDIES IN MALARIA, AS IT AFFECTS INDIAN RAILWAYS.*

By R. SENIOR-WHITE, F.R.S.

Malaria Research Officer, Indian Research Fund Association. Formerly Malariologist, Bengal-Nagpur Railway.

FROM the point of view of the Malariologist a railway is a Euclidean straight line. It might therefore be thought that any attempt to control malaria along its route would be foredoomed to futility, unless powers of entry and work on surrounding property were granted. For this reason very little has in the past been attempted towards the control of malaria on railways. The railhead port of Talaimanaar on the Ceylon Government Railway was reported on by James (1912), but no anti-mosquito measures other than screening seem to have been undertaken. The Khulna branch of the Eastern Bengal Railway was the scene of a quinine campaign (Eastern Bengal Railway press, 1925), which, as might have been expected, proved futile, though some valuable statistics and experience were gained from it. Though the St. Louis South-Western Rail Road in the United States of America have conducted anti-malaria operations at a cost of \$800, (Rs. 2,400, approx.),† per mile of track with excellent results, it was not until the writer was appointed Malariologist to the Bengal-Nagpur Railway that any Indian railway made any serious attempt to

deal with the malaria affecting it.‡ It is hoped that the account of various anti-malaria operations given in the present paper will convince the administrations of the various railways of India that the control of malaria as it affects their operations is not only practicable, but economic.

I.—Malaria during Railway Construction.

Whilst it is a commonplace of the text-books that railway construction in the tropics, with its 'aggregation of labour,' is nearly always associated with fulminant epidemics of the disease, yet in the past little has been done to obviate such happenings. Medical aid to the victims has usually been liberally forthcoming, but this is of small comfort to the engineer whose work has been brought to a standstill. "A death a sleeper" is a vivid generalization on the happenings on, for instance, the building of the ghat section of the Great Indian Peninsula Railway, the Beira Railway in East Africa, the Indo-Ceylon connection of the Ceylon Government Railway, though it is doubtful if even approximate figures exist to prove or disprove such assertions.

The Amda-Jamda branch of the Bengal-Nagpur Railway, built through the hills of the Singhbhum district of Chota Nagpur in 1923-24, proved yet again what is the price of opening up communications in hyper-endemic country without the help of the expert. In the worst length the Engineer staff were doubled, in the hope that one officer out of each pair would be in a state to do duty; labour died, or bolted, in such numbers that work was finally undertaken by a Pioneer Regiment from the Frontier. In the circumstances it is hardly to be wondered at that the cost of the branch line considerably exceeded the estimate.

It was shortly after this unfortunate experience that the same Railway had to undertake another construction in notoriously malarious country, namely the Raipur-Vizianagram Railway, which is being built to serve the new Imperial port of Vizagapatam. Of the 309 miles separating the two towns, 261 have to be constructed on one sanction.

The malaria map of India, (Christophers, 1926), leaves a large patch on the route of this railway blank. 'Probably hyper-endemic hill areas.' As will be shown at the end of this section, investigations by the writer have partly filled this gap in our ignorance, but meantime it suffices to be said that between seventy and eighty miles of the route lie within 'The Agency,' as described by the inhabitants of the Northern Circars, or in 'Madras,' as used by the people of the Orissa Feudatory States.

There are malarious tracts of general evil reputation in many parts of India. The Terai of the Eastern Himalayas, the Northern slopes of the Khasia Hills behind Gauhati, Lahore Cantonments (Mian Mir), most of Chota Nagpur in Bihar and Orissa, the foot of the Nilgiris, (where, incidentally, the station staff of Kallar leave for healthier quarters by the last train of the day and are brought back by the first train in the morning), to name but a few, are all notorious for their 'feverishness,' but it is probable that no locality in the whole Indian Empire has such a dreadful reputation as 'The Agency.' "Completed Agency Service" is an asterisked qualification in the Madras medical cadre list! The planter goes to the Duars expecting malaria, the Forest Officer of Singhbhum faces it with some equanimity, but 'going to the Agency' in Northern districts of Madras is a matter for bated breath! Though it may be legitimately argued that 'wind-up' to this extent has a psychological effect in inducing any attack to assume an ultra-serious nature, there is still no doubt that this is the largest hyper-endemic

* Paper reprinted by kind permission of the Editor, *Technical Papers, Indian Railway Board*, from *Railway Technical Paper No. 258*. Mr. Senior-White's paper is of such importance that we consider that it should have much wider publicity than would be given by its publication merely as a technical paper with a limited circulation.—En., I, M, G.

† Figures published whilst this paper was in the press claim a 97 per cent reduction in malaria incidence in nine years' work [van Hovenberg, *Railway Engineering and Maintenance*, XXII, 382; abstract *U. S. Public Health Reports*, XLIII, 878.]

‡ The E. B. R. have recently put up proposals for following the lead of the B. N. Ry., vide E. B. R. press report of 15th March 1927, "Methods of Malaria Control."

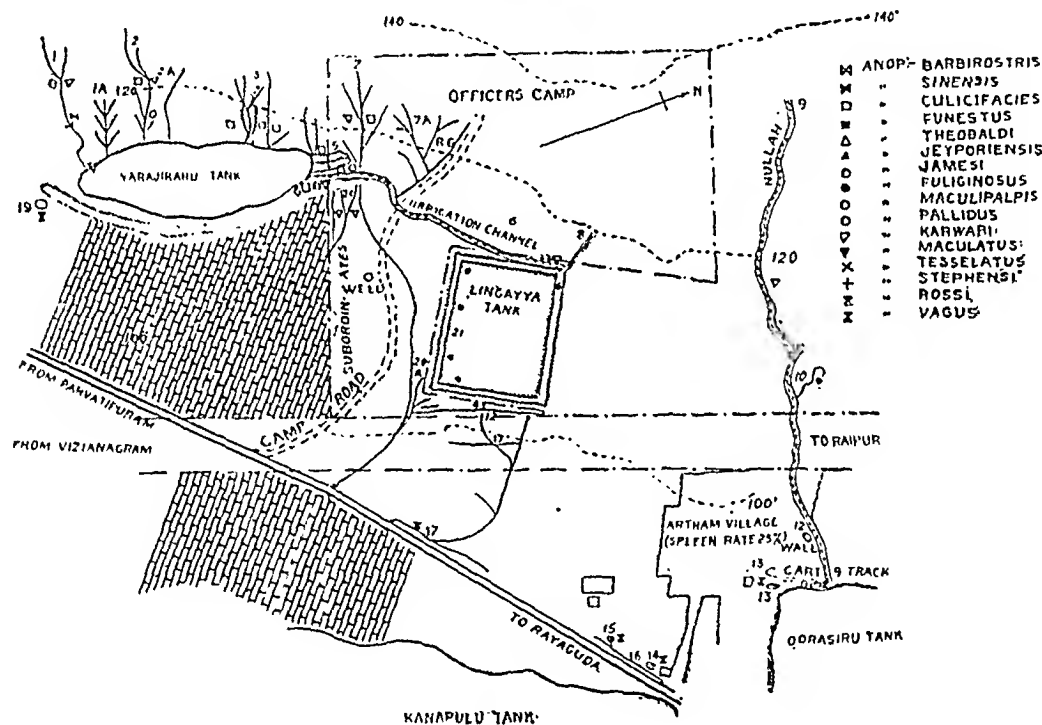
tract in the Empire. How serious conditions really are is set forth in cold statistics in the report of Perry (1915).

The experience of the surveys for the Raipur-Vizianagram Railway was fully confirmative of the deservedness of the evil reputation of this district. (a) The whole route was surveyed by officers of the now defunct East Coast Railway in 1883-86. Two years were spent on reconnaissance before a route was found across the Eastern Ghats practicable for a railway, two years more in actual survey. The records of this party are apparently lost, and what casualties they suffered is not known, but the writer stumbled on the grave of one of the engineers of the party, twenty miles south of the Madras frontier, in December 1926, being the next occasion since 1886 when the whole route was traversed by railway officers. (b) In 1897 a further survey was started from the southern end, also by the East Coast Railway. This party broke down from malaria 99 miles from Vizianagram, or after traversing barely forty miles of the hyper-endemic zone. (c) In 1907 yet another party essayed a re-survey, but likewise broke down after achieving only two miles more than their predecessors of ten years previous. (d) Lastly, in 1923, the twenty-four miles across the summit of the

medical arrangements he pitched a large base camp four miles north of Parvatipuram between a hill foot and a tank. All went well. The rains arrived, streams rushed down from the hills above, and nothing happened. Early in September of that year the writer was appointed, and proceeded to Parvatipuram. He had been assured in Calcutta that the unhealthy country did not begin for at least ten miles north of this base camp. The rains were practically over and the whole area at the hill foot was a mass of seepage, which with the cessation of actual precipitation was starting breeding. The grass of the camp was squashy under foot, and footprints filled up with water, which swarmed with larvæ, mostly *A. culicifacies*. Within a quarter of a mile of the camp was a village, spleen rate 25 per cent. It was obvious that, with the approaching hatching out of the first generation, an outbreak was impending. Accordingly, before any further work could be undertaken, this ill-placed base camp,* which with its stores was too large to move, had to be protected. The plan for this, as typical of the protection scheme subsequently evolved for actual construction operations, is given in Chart II.

Even before drains could be cut promiscuous oiling of the principal areas was undertaken, the drains

CHART II.



range were again re-surveyed. By this time the railway from Vizianagram to Parvatipuram (48 miles) was opened, and motor transport was available to a certain extent. Three months only, January to March, were spent in the field, and the Engineer in charge of the party left railhead with all his staff duplicated. On completion, only 25 per cent. were effective.

Meanwhile, another survey across Jeypore State to the west of the line under consideration had cost the lives of two officers of the party.

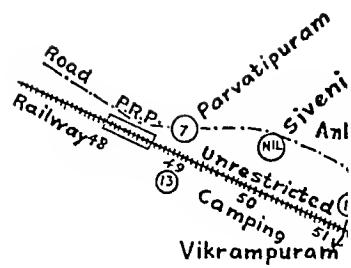
Such was the record when actual construction was sanctioned in 1925. Work was started from both ends, but the Northern end, from Raipur, (District IV), being in healthy country for the first thirty miles, need not be considered at present.

The District Engineer for the Southern end, (District I), took up his station in May 1925. In consultation with the Assistant Surgeon in charge of his

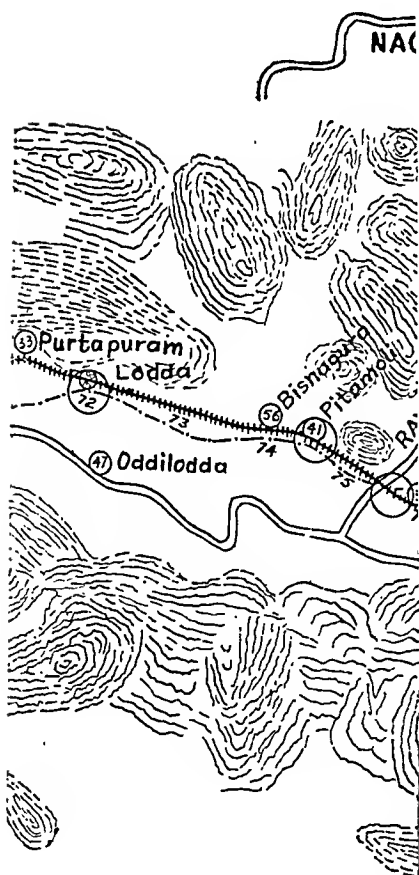
being cut subsequently to concentrate the seepage water and to dry out the intervening land. It will be noticed that hill foot contour drains were not used. They would have been far better, and far less expensive in upkeep than the herring-bone system put in, but speed was in this case the essence of the contract. Labour, at that time, was scarce and poor, as no actual importations had yet been made and the local labourer is disinclined for hard work of any kind, whilst contour drains would have involved difficulties with the stony hill foot soil. As it was, fresh seepages were always breaking out between drains, involving the putting in of additional ones, as is seen by those marked 'A' on the plan. However, the crude scheme worked, and an outbreak in the camp was averted, although the nearby village,

* To the layman the site would appear excellent. It was in a mango tope, with good water supply, which only proves the necessity of expert camp siting.

SPLEE



Porosurampuram ⑩ Gunan



unprotected on three sides, suffered its usual autumn outbreak. This was not only valuable as a demonstration to the engineers of what would have otherwise happened to the camp, but served as a very convenient source of blood films, as free medicines were offered in return for blood at the laboratory and medical tents. The findings are given on page 60.

Having secured a protected base, the next point,

which, of course, had the Malariologist been appointed sufficiently early, should have been the initial undertaking, was an examination of malarial incidence along the route. As at that period opening of construction was only authorized for the first thirty-eight miles from railhead, detailed survey was only carried out so far, conditions beyond not being examined at that time. The results are shown graphically in Chart I and in detail in Table I.

TABLE I.
Village Spleen Rates, Miles 48-86, R. V. Railway.

Village.	App. Mile.	Month Examined.	N.	V ⁰ .	V ¹ .	V ² .	V ³ .	V ⁴ .	V ⁵ .	V ⁶ .	V ⁷ .	Per cent.	Average Spleen.	REMARKS.
Parvatipuram ..	49	November ..	134	125	6	0	2	0	1	6.7	0.13	Schools only.
Kotuvallasa ..	49	December ..	60	52	2	4	2	..	..	..	..	13.3	0.27
Siveni ..	50	November ..	33	33	..	..	..	..	..	..	..	Nil.	0
Porsurampuram ..	51	December ..	79	71	2	3	2	1	10.1	0.23	School. River bank villages.
Vikrampuram ..	51	November ..	66	59	7	..	..	..	..	..	..	10.6	0.11
Artham ..	52	October ..	24	18	1	2	1	2	..	..	..	25.0	0.67
Dugi ..	..	December ..	80	69	2	3	2	3	1	..	..	12.5	0.39
Nitamulauram ..	..	December ..	26	23	0	1	1	0	1	..	..	11.5	0.38
Gunanapuram ..	52	December ..	10	9	0	1	10.0	0.20	In narrow valley be- tween hills
G u n a n a p u r a m	53	January ..	11	10	0	1	..	..	..	..	..	9.9	0.18
Agraharam.	..	..	..	..	..	..	..	..	..	..	..	..	..
Swaminaidu Valasa	54	November ..	50	35	10	3	2	30.0	0.44	Immigrant hill tribe. River bank. village..
Ankuluvallasa ..	..	January ..	10	4	1	2	2	0	1	..	..	60.0	1.60
Panthuluvallasa ..	..	January ..	21	10	2	3	3	2	1	..	..	52.3	1.43
Kumargunta ..	..	January ..	45	30	3	7	5	..	..	..	..	33.0	1.07
Gangaragu Valasa	54	November ..	49	35	13	0	1	..	..	..	..	28.6	0.33
Kotipam ..	55	November ..	67	52	11	3	1	22.4	0.30	Only Ooriya Brahmins with enlarge- ment.
Gumada ..	56	November ..	61	43	7	4	5	1	1	..	..	29.5	0.91
Sitarampuram ..	56	November ..	38	22	6	3	5	1	1	..	..	42.1	0.95
Komarada ..	57	November ..	102	72	13	9	8	..	..	..	..	29.4	0.54
Kotoo ..	58	November ..	28	21	3	3	..	..	..	..	..	25.0	0.43
Antuvallasa ..	58	November ..	27	10	4	10	..	0	1	63.0	1.30	Immigrant hill tribe. River bank. village..
Raipur ..	58	November ..	17	12	2	3	..	..	..	..	..	29.4	0.47
Dhondaluvallasa ..	58	November ..	12	3	2	5	2	..	..	..	..	75.0	1.50
Devakona ..	58	November ..	48	6	5	17	10	6	4	..	..	87.5	2.35
Rambudrapuram ..	60	November ..	15	6	4	1	3	0	1	..	..	60.0	1.33
Sholapadam ..	61	May ..	60	37	5	6	5	5	1	1	..	38.3	1.05	Only Ooriya Brahmins with enlarge- ment.
Kerada ..	62	December ..	71	22	4	11	16	6	9	1	2	69.0	2.30	
Koneru ..	62	December ..	8	3	0	2	1	2	..	..	..	62.5	1.87
Pedumu ..	63	December ..	25	10	2	3	3	2	3	..	..	60.0	1.92
Solawa ..	64	December ..	40	8	4	7	10	4	5	0	2	80.0	2.57	
Kusa ..	65	December ..	28	16	1	5	4	1	1	42.8	1.14	Immigrant Ooriyas.
Thimsivalasa ..	65	December ..	14	5	2	2	5	..	..	..	..	64.3	1.50
Dekguda ..	65	December ..	9	4	1	3	1	..	..	..	..	55.5	1.11
Kantikavallasa ..	66	December ..	34	23	5	2	4	..	..	..	..	32.4	0.61
Jimidipeta ..	67	December ..	75	50	7	9	6	1	2	..	..	33.3	0.76
Kotalujimidi ..	68	December ..	11	7	1	1	2	36.4	0.82	School.
Burasingh ..	68	January ..	32	23	3	3	2	1	..	..	..	28.1	0.59
Banapuram ..	68	December ..	28	23	2	0	2	1	..	..	..	17.8	0.32
Hamsa ..	70	December ..	30	13	9	3	2	2	1	..	..	56.7	0.13
Rajpuram ..	70	December ..	11	6	2	2	1	..	..	..	..	45.5	0.82
Purtapuram ..	71	December ..	15	10	2	3	33.3	0.53	School.
Lodda ..	72	December ..	26	16	6	3	1	..	..	..	..	38.5	0.58
Oddhilodda ..	72	December ..	17	9	1	3	3	1	..	..	..	47.1	1.17
Bishnagura ..	74	December ..	23	10	1	2	6	1	3	..	..	56.5	1.82
Pitamoli ..	74	December ..	27	16	4	2	3	1	1	..	..	40.9	0.96
Rayaguda ..	77	October ..	84	51	8	10	7	8	39.3	0.96	School.
Koligura ..	79	October ..	22	16	2	3	1	..	..	..	..	27.2	0.50
Boodiguda ..	79	December ..	7	0	0	3	1	3	..	..	..	100.0	3.00
Binarayanapuram	80	December ..	50	27	2	6	11	2	2	..	..	46.0	1.30
Kotapeta ..	80	October ..	65	52	2	4	2	4	0	1	..	20.0	0.60	
Bakriguda ..	81	October ..	24	18	2	1	2	1	25.0	0.58	School.
Kulajingi ..	81	December ..	34	19	4	7	2	0	2	..	..	44.1	1.00
Deodalla ..	82	December ..	30	18	2	5	4	1	..	..	..	40.0	0.93
Kometleapata ..	82	October ..	33	23	8	1	1	..	..	..	..	30.3	0.39
Penta ..	84	October ..	10	7	2	1	..	..	..	..	..	30.0	0.57
Ginganbadi ..	85	October ..	11	4	1	2	3	1	72.7	1.64	School.
Buddini ..	86	December ..	22	6	4	3	3	3	3	..	..	72.7	2.09

The information thus elicited was fully confirmatory of the appearance and reputation of the district, though disturbing to the engineers, who imagined that in working up to mile 86 they were running through fairly healthy country, halting at the edge of the real danger zone. A five mile length was discovered, (mile 62 to 67), where the spleen rates are as high as they are likely to be anywhere in the world.

Armed with this information the Acting Chief Medical Officer and the writer in conference with the heads of the Engineering Department and the District Engineer, proposed that when actual work was started the contractors should not be allowed to string out their labour all along their lengths, as is apparently the invariable custom in railway construction, but should be forced to concentrate them in camps, at the rate of two camps per three mile length, on sites capable of anti-mosquito protection, to be selected by the Malarialogist, in consultation with the District Engineer in respect of convenience for work, where practicable. This method of working was novel to the contractors, who are usually men from Kuteh, of no particular education, and accustomed to use up their coolies as they do their tools, with no concern about their health until this reaches a point when it affects them financially, for which reason a certain amount of opposition was incurred, and for a considerable time unauthorized camps kept springing up, which had to be dealt with. The location of the sanctioned and protected camps on the length is shown in thick circles on Chart I.

It was manifestly impossible to carry out a detailed mosquito survey of the whole thirty-eight miles prior to choosing sites, and such had to be selected 'by eye' in the first instance. Detailed surveys of selected sites were then undertaken as fast as possible, and protection plans for each drawn out and formulated. Owing to the necessity of providing each of a dozen contractors with at least one camp from which he could commence operations and locate his coolies, who were commencing to arrive, much dodging up and down the route was necessary. This, in a country with unbridged roads in so vile a state of disrepair as North Madras was very wasteful of precious time. In spite of a repair shop at base camp, cars were continually going out of action through the appalling tracks over which they were run, whilst late rains often brought down floods which rendered all or any of the unbridged rivers impassable for a day or more. Had more than thirty-eight miles been commenced at one time it would have been impossible to keep pace with demands for camps and simultaneously oversee actual drainage and oiling operations, indicating that in future, camps should be sited and protection therefor organized well ahead of actual importations of labour. As it was, contractors located in some comparatively healthy lengths had to be left without protection for some weeks, with more or less ill effects. It must, however, be remembered that all this organization work was a new thing, without any precedent save Panama, and there was no financial liberty on the scale of the great American undertaking.

Immediately following survey and drainage operations it was necessary to organize oiling. This was done with crude oil, applied to running water by swabs previously soaked in it staked in the channel or by spraying machines of the 'Four Oaks' pattern. Much of the country was very rough, and the coolie needed a free hand for movement. The type with the self-contained pump with which pressure is raised prior to being carried was therefore preferable to the type in which one hand pumps whilst the other directs the spray. The 3-gallon capacity machine, charged, was also found rather too heavy for use in rough country, and the 2½-gallon machine was preferred. Its smaller capacity, however, involves greater

waste of time whilst further supplies are brought from the sub-dépôt established at each camp. Machines constantly needed minor repairs, and the staff was placed under an ex-sergeant of Royal Engineers as chief inspector, which class of man alone seems to have sufficient organizing capacity and initiative to carry out the details of a rather complex organization.

As soon as possible returns were started to keep check on the results of the work. These were never completely satisfactory, and, in the writer's opinion, never could be so without undue expenditure. The medical staff of a construction consists of an Assistant Surgeon with each District Engineer, and one Sub-Assistant Surgeon per twenty mile length, and it is manifestly impossible that each man should visit each of a dozen camps daily and make out a sick return, in addition to running an out-patient dispensary at his headquarters. All that could be arranged for was that each contractor should submit a daily return of the approximate number of coolies in each camp and the number of cases of fever occurring during the day. *Bokhar* is an elastic term covering many other diseases than malaria. Again, great difficulty was experienced in getting the contractor to record only fresh cases each day, and in several cases deliberate falsification was proved, in the hope of getting enhanced rates of work such as are sometimes paid in ultra-feverish country. Finally, reliance in any form on the contractors had to be abandoned, and resort had to be made to the Sub-Assistant Surgeons obtaining 'figures' once each week by enquiry from the coolies themselves. In any case, one thing is certain, that the statistics do not err on the side of under-statement!

Even against this handicap, the results amply justified the measures taken. For ten months for which records had been obtained up to the time of the writer's departure for other work, the daily incidence of malaria never reached 2 per cent. of the total strength, a figure which the engineers considered negligible. It may be claimed, in fact, that construction through this hyper-endemic tract has proceeded with a lower morbidity from malaria than any large engineering work hitherto undertaken in India. The mortality from the disease has been nil.

TABLE II.

Monthly Malaria Incapacitation Incidence, Raipur-Vizianagram Railway, District I.

Month 1926,	Man-days,	Cases.	Daily per cent. attacked.
February	24,444	438	1.79
March	39,966	613	1.53
April	41,837	793	1.89
May	32,730	427	1.35
June	35,375	636	1.80
July	40,309	515	1.28
August	47,355	683	1.44
September	48,347	425	0.88
October	82,258	157	0.19
November	94,059	288	0.30

These results, moreover, were not obtained at any inordinate cost. Once the organization was got into working order, which took between three and four months, the upkeep charges, which consisted of the salaries of the inspector and his assistant, the drain maintenance and oiling coolies' pay, oil, and the running of a vanette car for travelling, together with a proportion of the cost of the malarialogist and his establishment at headquarters, only amounted to



Fig. 1.—The area in the foreground was originally a deep borrow pit, drained by a straight channel carrying a stream. The photo shows conditions at the close of the Monsoon. *A. maculatus* just starting to breed in large numbers.



Fig. 2.—Camp mile 55, showing typical huts used by construction coolies, and river margins breeding *A. culicifacies*.

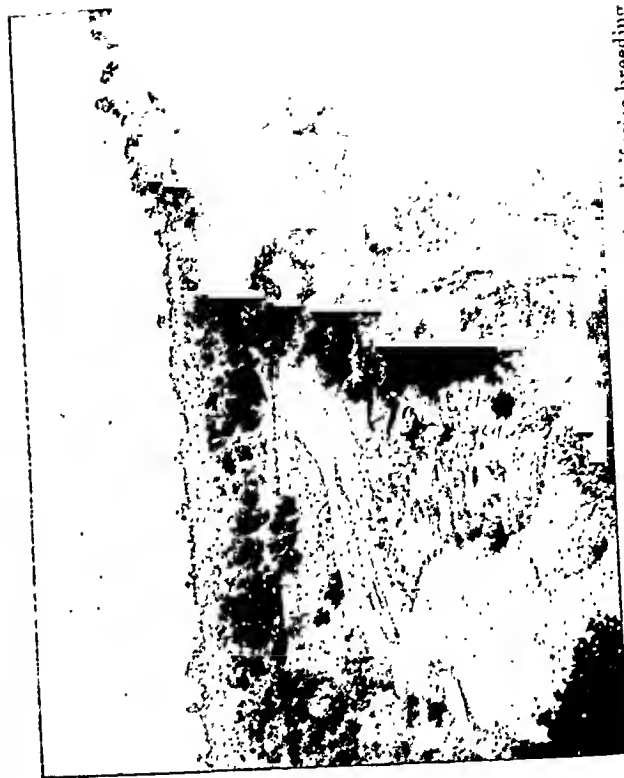


Fig. 3.—The gorge of the Rayangia River. *A. culicifacies* breeding to the right of the mid-stream sand bank. The dak bungalow is on the hill to the right of the picture.



Fig. 4.—Seepage area; ravine at Rayaguda. *A. funestus*. The dark bungalow is on the top of cliffs in the background to the left of the picture.



Fig. 5.—Nagavali River near mile 70, Raipur-Vizianagaram Railway. Lateral pools and channels swarming with *A. cuticifacies*.

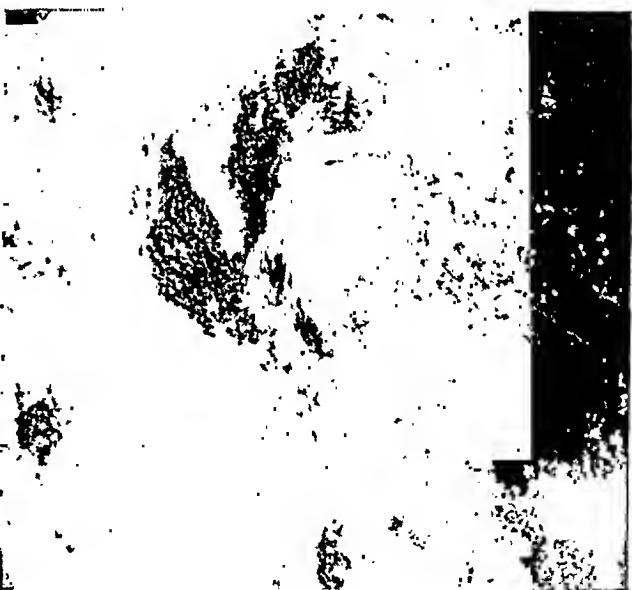


Fig. 6.—*A. maculatus* stream; Vizagapatnam Agency. (cf. Fig. 7.)



Fig. 7.—*A. funestus* stream; Vizagapatnam Agency. (cf. Fig. 6.)

Rs. 18 per mile of construction per month, a negligible amount in the vast sums involved in railway construction.

Several instances occurred indicating what would have happened had the ordinary construction methods been followed in such country, and, I think, proving the financial justification for anti-malaria measures on work of this nature. (i) Camp Rambudrapuram at mile 60 had to be located too near the village of that name, with a spleen rate of 60 per cent. There was a particularly contumacious contractor on this length who during an interregnum flatly refused to carry out the orders of the malaria section. The Assistant Engineer acting in charge of the District engaged him in a correspondence instead of taking instant measures. A fortnight was wasted by all concerned except the mosquitoes! An outbreak occurred and about forty coolies bolted. (ii) A camp, (not shown on the map), was put up at mile 62½, mainly to house coolies engaged in transport of stores across the Solawa nullah nearby whilst it was impassable for lorries during the monsoon. Owing to a misunderstanding it was not protected immediately. The fever rate was 12½ per cent. On starting protection it fell in two months to 3 per cent.

Railway construction has the further disadvantage from the malarialogist's point of view that conditions are never static. The camps were surveyed and protected on the original lie of the country. In few did conditions as shown on the plans endure for long. Streams were diverted for engineering purposes, embankments caused pools behind them, seepages were exposed by borrow pits. Fresh breeding places were thus created almost in a night, and once the writer had ceased to reside in and devote his whole time to the district, the sanitary inspector had to meet every emergency as it arose, without waiting for the next visit of the malarialogist.

Only a man of exceptional initiative and experience can successfully fill such a post of Sanitary inspector, and though, on subsequent inspection, the writer at times found that water which could only have produced harmless species like *vagus* was being treated, it was extremely rarely that he found a dangerous breeding place overlooked. Such never failed to declare its presence by a rise in the fever rate of the camp affected within a fortnight. A small outbreak at camp mile 59½ was traced to some seepage on a hill-side in dense bush that had been overlooked in the original survey. It was then just dry, but spraying all the huts after temporary evacuation was necessary to deal with the infected anophelines which they harboured.

It must be also remembered that the majority of the coolies engaged for construction work are infected prior to arrival, and number numerous gametocyte carriers among them. Many camps showed one or two days enhanced malaria incidence following rain or cold snaps. In every case absolutely no breeding could be found around them, nor anophelines in the huts. They could only have been in the nature of general relapses. How little the *kutcha* huts used by coolies on constructions afford protection from wet or cold and how suitable they are, with their leaf-plait walls, for harbouring anophelines, Fig. 2 shows.

A failure may be as instructive as a success, and the following is an account of one such. Thirty miles north of Parvatipuram lies Rayaguda, one of the two small towns of the Vizagapatam Agency Tracts. The spleen rate of the town is in the neighbourhood of 40 per cent., which is low compared with many of the surrounding villages. The Government dak bungalow is nearly a mile away from the town, and has a most evil reputation amongst touring officers of Government. An Assistant Engineer with staff took up his quarters in and around it at the start of construction, and suffered no ill effects during the monsoon. It was not until early in

December that this place could be attended to. The bungalow is situated on a cape of high land, with the gorge of the Rayaguda river, (Fig. 3) on one side and a deep ravine with nearly vertical cliffs on the other, (Fig. 4).

The river gorge breeds a certain amount of *A. culicifacies* in backwaters with *Spirogyra* after the rains subside, but the ravine is much the more dangerous, being full of seepage springs at the foot of the cliffs, which collect into a small stream with a *Ranunculus*-like plant interwoven with *Spirogyra* growing thickly on its edges. An irrigation channel, grass edged, takes off and follows the stream, and some of the rice fields near the mouth of the ravine are perennially wet through seepage. The whole area swarmed with *A. funestus*. The measures taken consisted of clearing off all the marginal vegetation of the stream, (this had to be repeated almost weekly), and rough weeding the seepage area, so that the oil had a chance of reaching the larvae, but the rice field, with un-reaped stubble over mud so soft and deep as to render it largely impassable, defied protection by oiling. That a certain amount of improvement was affected is shown by the fact that the engineer and his staff escaped serious malaria, but the health of the former gradually went downhill, and he had to be invalided.* To test the efficacy of the control the writer slept without a net for one night only in the middle of the monsoon in the dak bungalow, and contracted benign tertian malaria, but the oiling was two days overdue owing to flooded rivers rendering earlier arrival impossible, and as the oil was being washed away almost as soon as applied at that time of year, it is possible that more larvae than usual were managing to breed up. The place can only be dealt with efficiently by considerable engineering works involving either transforming the ravine into a lake by a series of dams to bury the seepage, or the lowering of the entire ravine level to dry out the margins of the stream and get the seepage into the main channel, (Fig. 4). As the whole bottom is sand, this latter would need never-ending upkeep. In addition the rice land containing seepage would have to be acquired and effectively under-drained. Here we have an instance where temporary methods of control fail.

The assistant engineer stationed at this place was moved, when failure was proved, to a healthy and protectable site north of the town.

The Anophelines of the Vizagapatam Agency Tracts.

The Anophelines of the district above described are as follows:—

A. sinensis; *A. barbirostris*; *A. vagus*; **A. culicifacies*; **A. funestus*; *A. karwari*; **A. maculatus*; **A. theobaldi*; *A. pallidus*; *A. fuliginosus*; **A. maculipalpis*.

Those marked with an asterisk were treated as potential carriers and attacked in drawing up control plans.

All of these have previously been recorded, from the Jeypore Hills to the West of the valley used by the railway, by Perry (1915) except *A. maculatus*. Compared with Perry's list, the noticeable absentee is *A. jeyporiensis*, but this species was never encountered, which is remarkable, as I have subsequently turned it up on the Coast at Vizagapatam.

* Without laying claim to any particular psychopathological knowledge, there seems to the writer to be something particularly depressing in the benign tertian strain of the Agency, in its effects on Europeans. I have watched the effects of only one attack each on three Europeans of the railway staff, and it is extraordinary how persistent are the mental effects of quite short and mild attacks of malaria, long after the actual infections were past.

The malaria carrier of the district *par excellence* is *A. funestus*. It swarms in every suitable streamlet, even in quite large rivers when these have shrunk to meandering side channels over sand where such touch the grass-covered main bank. The species is not found out on the main floor of the valley far from the hills, and the map, (Chart I), shows how the spleen rates decrease away from the hills. Pressure of administrative work left no time for dissection, but I found zygotes in one out of eight (12½ per cent.) taken in my assistant's tent outside Rayaguda dāk bungalow when surveying this spot in December 1925. Odd specimens used to be found in Artham base camp, around which it did not breed, which were traced to a nullah two thousand feet to the northwards, until this was also oiled.

In this district *A. culicifacies* seems to play quite a minor part in malaria causation, in fact it appears to be far more the anopheline of epidemic than of endemic malaria. As the rivers fall very low about Jahuary, small embayments in their sandy margins

ing with larvæ of *culicifacies*. Possibly the wind through the gap in the hills shown on the map to the east carried adults into the camp, though the river approaches considerably closer to other camps without affecting their health (Fig. 5).

A. maculatus.—The distribution of this species is so patchy that, could the underlying reason be elicited, important information on the controlling factors in anopheline distribution would be gained. It was, of course, impossible to undertake detailed researches, and pH values alone afforded no indication of differences, but throughout the whole 38 miles *maculatus* was only found around the camp at mile 63, but here it swarmed in several streams. Fig. 6 shows a *maculatus* stream and Fig. 7 one containing *funestus* only. The two are less than two miles apart, and appear of identical type.

The only difference noticed was that the former was actually on the spurs of the main range bounding the valley to the west and running back to the 3,000 foot plateau, the latter on a small chain of hills

Parasite Findings, Vizagapatam Agency Tracts.

Month.	Number found positive (thin films).	M. T.	B. T.	Q.	M.T. and B.T.	M.T. and Q.	B. T. and Q.	Percentage.			REMARKS.
								M.T.	B. T.	Q.	
1925,											
September ..	1	1	Crescents once.
October ..	3	1	1	1	..	..	..	33	33	33
November ..	14	5	4	4	1	..	..	40	33	28
December ..	38	9	14	9	5	1	..	31	42	26	Creseents twice,
1926											
January ..	15	2	8	2	3	23	63	13	Single September 1925 second included for percentage.
February ..	3	1	2	..	..	..	..	33	66	..
March ..	..	..	..	..	..	..	..	..	..	..
April ..	4	1	3	..	..	..	..	25	75	..
May ..	1	..	1	..	..	..	..	..	100	..
June ..	..	..	..	..	..	..	..	..	..	..
July ..	1	1	..	..	..	..	..	100	..	..
August ..	3	3	..	..	..	..	..	100	..	..
September ..	7	3	4	..	..	..	..	37	50	12
TOTAL, ..	90	26	37	17	9	1	..	35	46	20	

NOTES.—The very small number of crescents found agrees with the remark of Perry (1915) that in this country "crescent formation is by some means checked."

Perry's figures are complicated for comparison purposes in that they did not diagnose rings. His percentages appear to be about 14, 40 and 45 for the three parasites. In other words, at the foot of the Jeypore Hills there is apparently more M. T. and less Quartan than in the hills themselves, but owing to M. T. (other than crescents) being normally seen as rings only, the difference is probably not a real one.

swarmed with this species. The whole bank of the river shown in the distance in Fig. 2 bred heavily. Oiling so great a length was impracticable, and I watched events with apprehension. Yet no outbreak took place here. The only source of *funestus* nearby, a tributary nullah, was under control. Possibly the known higher affinity (Perry, 1915) of this species for cattle over man deflects it in villages which, like all those of the Agency, swarm with cattle kept close to the houses. One outbreak, in May, however, was unquestionably to be attributed to *culicifacies*. At this time of year all but the main rivers of the valley are dry, and the camp on the site of Jimidipetta station, (mile 68), was at this time going 1½ miles to the Nagavali River for its water. In this direction lies Banapuram village, with a spleen rate of 18 per cent. only. In drawing up plans for this camp some months previously I had felt quite safe in neglecting the river. Making search for the cause of the outbreak, relict pools in the sand of the river bed were found swarm-

isolated from the main range by a narrow back valley.

A. karwari.—The district is singular, as far as I am aware, in the wide distribution of this species without the closely related *maculatus*. Perry, who also found this species, makes no remark on this point, which has been checked out sufficiently, I think, to be taken for a proved fact. As the species, however, was nearly always found in company with *maculipalpis* attacking the latter obliterated the former, and so there was no opportunity of checking Hacker's (1919) hypothesis that *karwari* is of no practical importance as a carrier.

A. fuliginosus.—The last remark indubitably applies to this species also, at least as regards this district. Chart II shows that it swarmed, mainly in the cold weather, in Lingaya Tank in the very centre of Artham base camp. Examination of a very similar tank close to the village of Siveni, (mile 50), where

the spleen rate is *nil*, showed this also to be swarming with *fuliginosus*. Siveni is on the road from the north, and numerous infected persons must pass the night hereabouts. I decided, therefore, to neglect the *fuliginosus* breeding in the base camp, with the happiest results. Further instances of its apparent non-importance as a carrier in other parts of India will be given in subsequent sections.

A point which struck the writer very forcibly was the relatively very small amount of breeding for the very high spleen rates found. There is, of course, no medical aid normally available to the villagers of these wilds. An infection once acquired goes on until natural immunity checks it. By this time the patient has been a gametocyte carrier for months or even years, and with villages full of such the ratio of infected specimens to the total carrier-species population is probably very high. In every sense, then, these villages are hot-beds of malaria, and every effort was made to locate camps as far distant from them as possible. The danger of using resthouses the verandahs of which when not occupied, (and I have found the last entry in the visitors' book of Agency resthouses to be two years old), are used by passers-by for shelter is considerable, as pointed out by Perry, owing to the high number of gametocyte carriers in the country. Such dangers, however, cannot always be avoided.

far south, and for it should be substituted the barring of hill foot endemicity. The hyper-endemic area commences ten or fifteen miles further north than the map shows. In Table III are given spleen rates taken in villages where halts were made during a rapid traverse of the whole 260 miles in December 1926, which drives one line of survey clean across the blank area. This was only a preliminary inspection made hastily to enable some idea of the country from the malaria point of view to be acquired before the writer severed his connection with the railway. Enough was seen to make it obvious that the whole length would well repay intensive study, and that, considerable as have been the difficulties encountered during practical control of the disease further south, they are slight compared with what will be encountered when the actual crossing of the Eastern Ghats is undertaken in the near future. As no malarialogist, and few other Europeans, have ever previously crossed the ghats by this route, some description of the country may not be out of place.

From mile 86 the actual approach to the summit, (1,300 feet), is up a narrowing valley, sparsely inhabited by aboriginal tribes. It is this valley, ten miles in length, that has been responsible for the disasters to the survey parties. The writer believes that his spleen rate of 92 per cent. in twenty-five children at Pedda Brindabari, (mile 96), near the

TABLE III.
Spleen Rates taken between miles 86 and 200, R. V. Railway.

Village.	App. Mile.	Date Examined.	N.	V ⁰ .	V ¹ .	V ² .	V ³ .	V ⁴ .	V ⁵ .	V ⁶ .	V ⁷ .	Per cent.	Average Spleen.	REMARKS.
Batpuram ..	93	4-12-26	10	3	4	2	1	..	..	..	..	70.0	1.10	Agency Tracts.
P. Brindabari ..	96	4-12-26	25	2	7	9	5	2	..	..	..	92.0	1.92	Do.
Bissemkattak ..	102	5-12-26	20	8	5	4	1	1	1	..	..	60.0	1.25	Do.
Tikarapara ..	111	5-12-26	50	15	12	5	10	5	3	..	..	70.0	1.74	Do.
Ambadola ..	126	7-12-26	71	41	7	11	7	3	2	..	..	42.2	1.00	Do.
Sigor Kupa ..	133	8-12-26	18	6	0	3	3	1	4	1	..	66.7	2.50	Kalahandi State.
Norula ..	142	8-12-26	19	4	0	0	1	..	..	..	..	7.9	0.33	Do.
Lutherband ..	156	9-12-26	42	34	4	4	..	..	..	..	..	8.1	0.29	Patna State.
Titlagahr ..	163	10-12-26	83	76	4	2	0	0	1	..	..	8.4	0.16	Do.
Satighat ..	163	10-12-26	18	16	1	1	..	..	..	..	..	11.1	0.17	Do.
Sointila ..	..	11-12-26	91	81	9	1	..	..	..	..	..	10.0	0.14	Do.
Haldi ..	172	12-12-26	17	14	3	..	..	..	..	..	..	17.6	0.18	Do.
Latour ..	199	12-12-26	35	16	5	3	2	4	1	..	..	48.4	1.08	Do.

A second point which deserves mention in connection with railway malaria is the harmlessness of borrow pits when freshly excavated. Only *A. vagus* is at all common, as would be expected from the muddy nature of the contained rain water. [Old borrow pits which have become filled with vegetation are another matter and are dealt with in a subsequent section]. The exception to this statement is when the pits expose seepage springs near their bottom, when *A. funestus* may occasionally find entrance. Borrow pits are mainly dug in dry weather, when seepage does not occur. They fill with the rain of the following monsoon, and when the seepage again arises, it is hidden in the rain water. Which pits are possibly dangerous, therefore, it is impossible to be certain about. In hill foot localities, therefore, where seepage was possible, such pits were treated with cresol, on the chance that seepage might be mixed with the rain water and let in *funestus*.

Data towards filling the blank area on the Malaria Map.

Table I gives data enabling the southernmost portion of the blank area on Christophers' (1926) map to be filled in. Incidentally it may be mentioned that his dark blue area (hyper-endemic) is brought too

dāk bungalow of Balugar, is unique in the number of children found for such a rate.* Usually such extreme conditions are productive of few children, (cf. Boodaguda mile 79, Table I), but these aboriginals appear perfectly healthy, and their villages are among the neatest and cleanest in all India. The houses are in two long lines, of uniform roof height, facing inwards to one another, about one hundred feet apart, the cattle sheds occupying the central area, which is swept by the united women of the village daily. Back of the houses, within the panther fence universal in these parts, are gardens. That their immunity even in adolescence is only partial, however, is indicated by our finding, in the jungle, a very sinister little temple, which the headman explained was the shrine of the fever devil, only invoked when malaria was bad. The image of the devil was in bad repair, however, suggesting that the season had been a normal one!

The intense malaria of this valley is due not only to small deeply cut nullah streamlets, but also to the

* Whilst this paper was passing through press, Kligler recorded a 94.2 per cent. rate among 139 children in Palestine, [*Jo. Prev. Med.*, I, (2) 155, (1926)].

main stream draining the centre, the Kedapara, the sandy margins of which were swarming with anophelines, whilst in the last few miles below the summit the flight range from the main stream easily reaches the foot of the enclosing mountains. In other words, there is not a single spot in the upper reaches of the valley which is safe, save only in the monsoon, when all water is in flood. At that time of year, however, travel in this country is impossible.

Beyond the summit lie ten miles of open plateau, irrigated from little foot hill streams, and only less intensely malarious than the approach, on which is situated Bissemkattak, the last administrative outpost of the Madras Presidency. Meaning 'Poison Fort,' this place is literally a name of terror down on the Coast, and this is hardly to be wondered at, for in addition to its unhealthiness it is more or less isolated by flooded rivers for several months each year, and it has no telegraph. For a small town of several hundred people the spleen rate of 60 per cent. is sufficiently remarkable. Most of the inhabitants are descendants of Telugu immigrants from the plains. The writer's value of the spleen rate taken on a small number of children agreeing closely with that of the Government Sub-Assistant Surgeon stationed here taken in a much larger number, I have less hesitation in including in Table IV the latter's figures

and 1914) on malaria in the Central Provinces. Comparison of the table with Christophers' map shows the effect of crossing, between Suamar and Arand villages, the dark blue patch shown south-east of Raipur, and shows how sharply demarcated the boundaries of a malarious zone can be. These here coincide exactly with those of the *sal* forests, and it was just on this length, as adumbrated in an official report by the writer eight months before it happened, that the construction of District IV of the railway was considerably hampered by malaria in the autumn of 1926. No control measures were in force on this district, and coolies were encamped wherever they wished.

II.—Malaria in Connection with Tunnelling Works.

Saranda Tunnel, on the main line between Calcutta and Bombay, 218 miles west of the former, in the Singhbhum District of Chota Nagpur, is driven through the range from which it takes its name at an elevation of about 1,600 feet. The surrounding country is heavily forested, sparsely inhabited by aboriginal tribes, Hos, Mundas and Oraons, the feverishness of whose jungles has been the chief reason for the preservation of their racial entities. So wild, indeed, is the neighbourhood that even to-day elephant sometimes roam round the station, and it was a mile

TABLE IV.
Spleen Rates around Bissemkattak.

Village.	Month Examined.	N.	V ⁰ .	V ¹ .	V ² .	V ³ .	V ⁴ .	V ⁵ .	V ⁶ .	V ⁷ .	Per cent.	Average Spleen.	Remarks.
Bissemkattak ..	?	100	46	13	17	11	11	2	54.0	1.34	Cf. Table III.
Sarthalli ..	Nov.	44	18	12	9	2	3	..	..	..	59.1	1.09
Nuaguda ..	August	46	29	7	9	1	..	..	..	..	36.9	0.61
Neogam ..	June	20	4	13	3	..	..	..	..	..	80.0	0.95
Bathraguda ..	June	31	6	9	7	2	7	..	..	..	80.6	1.84
Bittaguda ..	June	9	6	3	..	..	..	..	..	..	33.3	0.33
Deopaguda ..	June	32	6	8	7	5	2	4	..	..	81.2	2.03
Rotatikiri ..	June	29	16	10	2	1	..	..	..	..	44.8	0.58
Gadwaguda ..	June	17	4	6	7	..	..	..	..	..	76.5	1.18
Jaganatpuram ..	June	6	2	3	1	..	..	..	..	..	66.7	0.87
Patubonda ..	July	22	10	11	1	..	..	..	..	..	54.5	0.59
Panasaguda ..	July	13	9	3	1	..	..	..	..	..	30.8	0.38
Buttaguda ..	July	19	10	4	4	0	1	..	..	..	41.4	0.84
C. Motukahadi ..	July	31	17	11	3	..	..	..	..	..	45.2	0.55
Chamehadaguda ..	July	22	7	8	6	1	..	..	..	..	68.2	1.05
Balthadiguda ..	July	9	3	5	1	..	..	..	..	..	66.7	0.78
Jimmiriguda ..	July	32	7	4	8	6	6	1	..	..	73.5	2.09
Sanyasiguda ..	July	12	4	5	2	1	..	..	..	..	66.7	1.00
Suraguda ..	August	16	4	4	6	1	..	..	..	..	75.0	1.44
Purnapuri ..	August	10	3	4	3	..	..	..	..	..	70.0	1.00
Harruguda ..	August	12	5	3	2	1	1	..	..	..	58.3	1.17
Porichaguda ..	August	27	7	7	4	2	5	2	..	..	74.1	1.89

for the town and for all villages within a five mile radius, which show that even in such hyper-endemic country the intensity of the disease is quite patchy.

Beyond the Bissemkattak plateau the country is again of the type existing below, forest or scrub-covered hills with rice in the valley bottoms, and so continues right up to the Madras frontier. Crossing this into Kalahandi Feudatory State heavy *sal* forest is entered, in which spleen rates are equally high, but in ten miles, leaving the forest and entering the plains sloping down to the Tel River, the rate drops abruptly to 8 per cent. This healthy country extends to the end of the blank patch at the Tel River, which is the boundary between Kalahandi and Patna States.

In Table V are given the detailed spleen rates for the seventy miles of the railway which will lie within the Central Provinces between the Jonk River and Raipur, for amplification of Kendrick's reports (1911

west of here that the Bombay Mail was completely derailed in collision with an elephant soon after the tunnel was opened.

The original tunnel was constructed in the eighties, and the malaria rate, though no records exist, appears to have been extremely high. It is said that mortality and bolting among the labour so disorganised the accounts that the gangs were paid, shift by shift, as they emerged from the workings. Several of the Cornish miners who formed the subordinate tunnelling staff died of malaria, or more probably of blackwater, for which the district is notorious.

For many years after its construction the tunnel area remained uninhabited, and speedily reverted to its primeval isolation. Then, with increasing traffic, a passing place on the single line was opened about half a mile west of the tunnel. This proved unsatisfactory for several reasons, not the least of which was the



Fig. 9.—West Portal, Saranda old Tunnel, showing track side drains breeding *A. theobaldi*.



Fig. 10.—Blackwater house, East portal, Saranda Tunnel. The railway cutting shows in the right foreground.

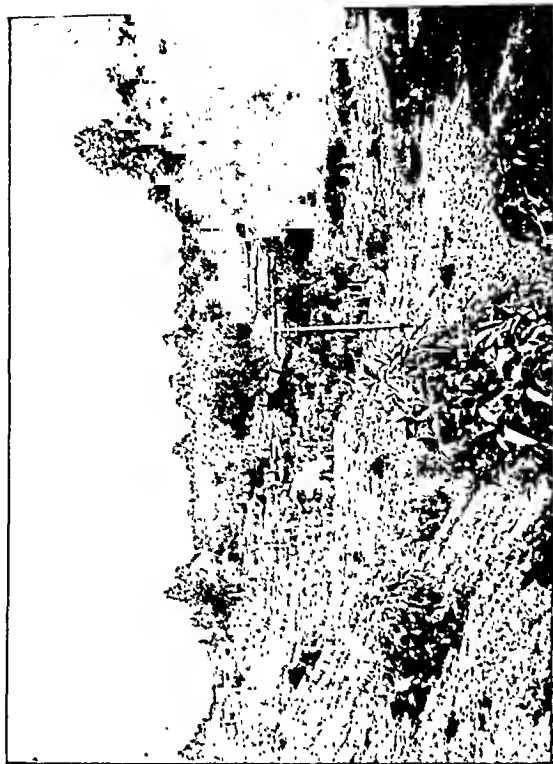


Fig. 11.—Posoita Station—Spleen rate 86%. The borrow pits mainly responsible for the *funestus* breeding are in the centre of the photo. (Vide Fig. 12.)



Fig. 12.—Near view of part of connected borrow pits at Posoita Station (vide Fig. 11). A typical *funestus* breeding place.

extreme malariousness of the spot chosen. The reason for this will appear subsequently. Shortly after the War, with the post-war boom in iron ore traffic, a passing place to shorten the ten miles in maximum grades which separate Posoita and Gailkera stations became imperative, and Saranda 'station,' which does not appear in the public time tables, and which is really only a short length of double line to pass trains on, was brought into existence at the east of the tunnel. The effect of residence in such a place is seen in Table VI.

With further increase in ore traffic, it became necessary to double the thirty-eight miles between Manharpur and Chakradharpur, whence doubling already existed to Tatanagar, the junction for Jamshedpur, and this involved duplicating the tunnel. The works were let on contract to a European firm in 1925.

Now tunnel construction differs from ordinary railway building in that it involves the employment of a large amount of highly paid skilled labour, owing to

labour had practically disappeared, and with local aborigines taking their place as coolie labour, the next year's records open with a malaria rate of 8½ per cent. only, which, as might be expected, gradually fell to just over 4 per cent. in May.

It was in that month that the writer was instructed to take charge of the malaria situation here, with a view to preventing the happenings of the previous fever season. Even in May there was a good deal of water about. The existing tunnel is perennially wet, and from the west portal there is a never failing running drain down each side of the track. These were full of water cress, and swarmed with larvæ of *A. theobaldi*, (Fig. 9).

Further to the west, around the site of the original abandoned station,—'Old Saranda'—were numerous breeding places of *A. funestus* and *A. culicifacies*. The survey map, (Chart III), does not need any very detailed study to see why malaria was from the outset so appalling at this site.

TABLE V.
Spleen Rates, miles 245—309, R. V. Railway.

Village.	App Mile.	Month.	N.	V°.	V¹.	V².	V³.	V⁴.	V⁵.	V⁶.	V⁷.	Fer cent.	Average Spleen.	REMARKS.
Suamar ..	249	February ..	13	6	1	4	1	0	1	..	..	53·8	1·31	
Kumakan ..	249	February ..	49	40	3	4	1	0	0	1	..	19·5	0·41	
Bagliahara ..	255	February ..	16	7	1	3	1	1	2	1	..	56·3	1·87	
Patiapali ..	260	February ..	17	8	2	2	2	3	..	..	..	52·9	1·41	
Kasibara ..	261	February ..	27	11	3	6	2	4	1	..	..	59·2	1·56	
Auladabri ..	263	February ..	15	9	0	3	2	1	..	..	..	40·0	1·07	
Hukarband ..	266	February ..	15	3	4	3	2	1	0	2	..	80·0	2·13	
Harbanda ..	268	March ..	42	10	9	14	7	1	1	..	..	73·8	1·60	
Pachenda ..	269	March ..	45	33	2	5	3	2	..	..	..	26·6	0·64	
Araud ..	270	March ..	34	11	5	9	5	2	2	..	..	67·6	1·65	
Khusrangi ..	271	March ..	67	50	6	8	1	1	1	..	..	25·3	0·51	
Umarda ..	272	March ..	26	11	5	6	1	3	..	..	..	57·6	1·23	
Boriajhar ..	273	March ..	54	42	5	6	1	..	..	..	..	22·2	0·37	
Jhalkamari ..	..	March ..	29	22	1	4	..	..	..	..	..	24·1	0·52	
Mongara ..	275	March ..	50	42	6	1	1	..	..	..	..	16·1	0·22	
Labra ..	275	February ..	20	19	0	0	1	..	..	..	..	5·0	0·15	
Mahasamand ..	276	February ..	..	..	..	..	..	..	..	..	..	15·0	..	Figures in detail lost.
Kharora ..	278	February ..	37	32	2	0	3	..	..	..	..	13·5	0·30	
Belsora ..	280	February ..	45	39	0	3	1	2	..	..	..	13·3	0·42	
Murhana ..	281	February ..	25	23	0	1	1	..	..	..	..	8·0	0·20	
Ghorari ..	282	February ..	33	30	1	2	..	..	..	..	..	9·1	0·15	
Nisida ..	283	February ..	22	22	..	..	..	..	..	..	..	Ni/	0	
Paragaon ..	284	February ..	29	24	1	2	1	1	..	..	..	17·2	0·41	
Arang ..	287	February ..	45	40	3	2	..	..	..	..	..	11·1	0·16	
Hasand ..	299	February ..	46	45	0	1	..	..	..	..	..	2·1	0·04	
Raipur Station ..	309	February ..	96	93	0	1	0	0	2	..	..	3·1	0·12	Garihari village.

the amount of machinery in use. The Ooriyas and Chhatisgarhis who furnish the bulk of ordinary earth-work labour are unfitted for such duties, which are undertaken by Bombay-side men and Punjabis. Men of this type then formed the mechanic class on the tunnel works, with originally some Chhatisgarhis for purely coolie labour. Many of the mechanics came to the works from the Khyber Railway, and it is possible that they had a good deal of malaria in them to start with.

What might have been foreseen, happened. The works were opened in August 1925, and malaria was at once responsible for an incapacitation rate of 21 per cent. Though this fell to 18½ per cent. in the next two months, thereafter it rose with the onset of the true malaria season until the records for the year close in the second week of November with a 34 per cent. sick rate, at which time the Assistant Surgeon died of blackwater and the office staff were so disorganized that no further records were kept until the end of the epidemic in March 1926. By this time the Chhatisgarhi

The locality readily divides itself into three parts; Saranda station, open since 1919, with a small permanent population of railway employees, engaged in working the passing place on the open line; the main camp, more or less on top of the original tunnel; and old Saranda, a camp in connection with the deep rock cutting approaching the western entrance to the new tunnel, situate in and around the abandoned buildings of the original station. The whole extends over about a mile and a quarter of the line.

The spleen rates as they existed in July 1926 are given in Table VI.

These indicate in the first place how much more heavily malaria falls on the plains child than on the aboriginal of the same stage of life. Also they show that the main camp was distinctly the most unhealthy of the three areas, and seem to indicate that here conditions were almost too much for the aboriginal, whose rate nearly equalled that of the plains races. Among the latter, however, are included a few Gurkhas, children of chowkidars, and it was obvious that of

all the melange of races on the works, the Gurkha was by far the worst sufferer. It was really astonishing to see the state of wreckage to which malaria had reduced these men and their families.

Naturally, blackwater fever was present. Three cases, two fatal, occurred in the year of working. One was the Assistant Surgeon employed by the contractors, previously mentioned; the other was a child aged five, whose case the writer was fortunate enough to see within twelve hours of the onset, and follow to the fatal termination. As always happens with blackwater, however, none of the apparatus one would like to have employed was available. The case notes are given in an appendix to this section. A fourth (also fatal) case of blackwater occurred later before the malaria was got under control. Two out of the four cases occurred in one hut (Fig. 10), being father and child. This hut is situate immediately above the cutting at the east end of the old tunnel, above track side drains running with seepage for at least six months of the year, and with other perennial breeding places nearby. The drains at the east end of the tunnel did not contain watercress, and the species found was *A. culicifacies*, not usually associated with blackwater cases.

Old Saranda presented a more difficult problem. The track side drains emerging from the tunnel at its western end, originally full of *theobaldi*, were nearly completely rid of it by cleaning out the watercress, to the vast disgust of the coolies, who used it for food. Weekly oiling then rendered the twin streams absolutely sterile. The series of deep pools in the new cutting, which were unapproachable in many places for examination owing to its vertical sides, and which only awaited the resumption of work after the monsoon to disappear in the course of ordinary operations, were fortunately found, in the few places where their surfaces were approachable for examination, to be breeding *rossi* only. A swamp below a culvert, (No. 13), in the course of the track sides drains where these leave the line and are continued as a definite stream south of the railway, was dried out by a through drain, and the oil coming down from No. 6 drains above completed the control; but a dam, (No. 11), with a swamp (No. 10) on one side and a feeder stream, (No. 12), meant quite considerable engineering works if they were to be rendered sterile. These would have been undertaken had there not been worse nearby in the shape of a dam, (No. 8), partially broken down, and so with a permanent swampy floor breeding *culicifacies*

TABLE VI.
Spleen Rates, Saranda Area.

Locality.	Number Examined.	Degrees of Enlargement.									Average Enlarge- ment.
		Nil.	1f.	2f.	3f.	4f.	5f.	6f.	7f.	Per cent. Enlarged.	
STATION.											
Plains races	5	2	0	1	1	1	..	..	..	60'0	1'80
Aboriginals	6	5	0	0	1	..	..	..	..	16'7	0'50
MAIN CAMP.											
Plains Races	50	17	0	5	7	10	9	1	1	68'0	2'58
Aboriginals	5	2	0	0	1	1	1	..	..	60'0	2'40
OLD SARANDA.											
Plains Races	11	5	2	0	2	1	1	..	..	54'5	1'54
Aboriginals	21	13	2	1	1	3	1	..	..	38'1	1'14
TOTAL ..	98	44	4	7	13	16	12	1	1	55'1	1'98

Chart III gives a plan of the breeding places of the three areas.

Owing to the very large amount of work to be done, it was decided to limit operations to the quarter mile circle around each of the three inhabited areas. Of those affecting Saranda Station; the stream, (No. 5), was trained, and its margins, oiled; the track side drains, (No. 6), were cleaned out and oiled; and drain 16 carrying the pump outflow from No. 2 shaft canalized, and the spring causing swamp 17 put into a short drain leading into the latter, the whole being oiled.

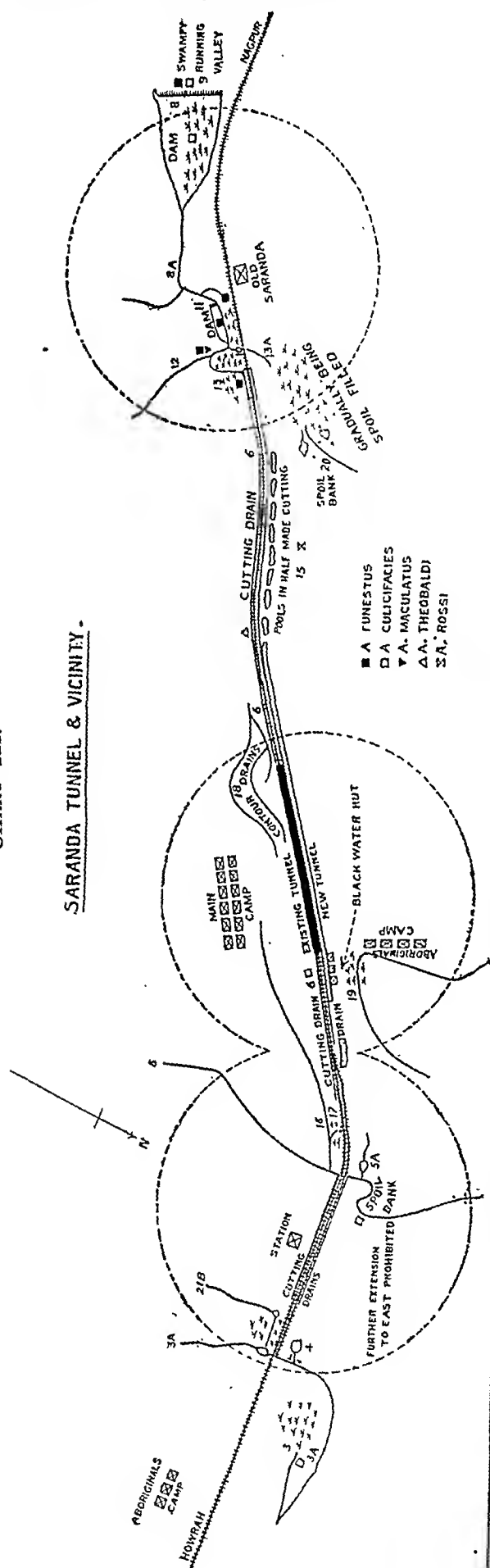
Of those affecting the main camp, Nos. 6 and 16 are the same as have just been referred to; No. 19 swamp had a drain put through it; and the hill side contour drains, (No. 18), which had been put in years back to keep the rush of water off the hillside from falling in sheets on to the track over the edge of the cutting at the west end of the tunnel, were thoroughly cleaned of bush and their floors made, as far as possible, of even slope. As they can now be walked along without difficulty, it is easy to see the few places where seepage springs arise in them, and treat the same with oil.

in great numbers, with (No. 9), a swampy valley between high hills extending below it parallel to the line for nearly a mile. This dam and valley were not on railway land, and the drainage of the latter was rendered impossible by the fact that the outflow passed through an arch under the line on high embankment, the floor of which was level with the top of the swamp. To put in a central and bank foot contour drains to dry out the valley and concentrate the water for oiling if necessary would be useless since the level of the floor of the arch did not permit of an outflow for the drains.

It is this valley, a mass of *A. funestus* breeding, which doubtless made the former station here so unhealthy. In consultation with the District Engineer and the contractors therefore, it was decided to permit only aboriginals to reside in the camp here. As a matter of fact, few such were living there at the time of the survey, and they appeared quite reasonably healthy. Very significant, however, was the abandoned camp of a gang of Bengal Mohammedans, close to the huts of the aboriginals, who had bolted on account of malaria.

CHART III.

SARANDA TUNNEL & VICINITY.



On account of the prevailing wind, control was taken down to breeding place 13, nearly three-quarters of a mile from the centre of the main camp. Owing to the amount of wild animals in these forests, the ordinary sanitary inspector class absolutely refused to enter them, and here again it was necessary to appoint an ex-sergeant of the British Army as Inspector. The results are given in Table VII, and show how the disease was almost immediately got under control. There was a steady decrease in incidence every month from August to November, in which period one might well have expected some signs of the autumn apex to appear. In November and December, when I was satisfied that all breeding was under control, 10 grains of quinine on the weekly market day were given to all who would take it, and by Christmas the only sufferers from malaria were a few persons who had persistently refused quinine.

TABLE VII.

Monthly Malaria Percentage, Saranda Tunnel Works.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1925	21.5	20.3	18.3	?	?	?
1926	?	8.8	7.2	4.1	6.0	6.2	5.7	4.1	2.9	2.8	2.4	2.4

The original cost of the survey and preliminary drainage works, including salaries, was in the neighbourhood of Rs. 3,000; thereafter maintenance, including salaries and oil, has averaged Rs. 92 per week, but the inspector has time on his hands for attendance on other stations, and when these are taken up and part of his salary allotted to them, the cost will fall to Rs. 39 weekly. For this trifling amount one of the most notoriously deadly spots in the whole of Singhbhum has been rendered practically malaria free.

APPENDIX I.

Notes on a case of Blackwater Fever at Saranda Tunnel Works, July 1926.

Child, male. Aged 5 years. From Rewa State. Residence at Saranda, over twelve months.

History.—Malaria on and off for a year. Quinine taken irregularly. Three days before onset of blackwater an attack of malaria. For forty-eight hours prior to attack gr. iv quinine sulph. in solution once daily.

Attack.—Dark urine noticed by parents 9 p.m. Total suppression of urine for twelve hours thereafter. Then seen by Assistant Surgeon. Grain ii (half an ampoule) caffeine sodii, benzoate intramuscularly. Within a few minutes of injection passed 10 oz. coffee coloured urine with heavy black deposit thrown down at once.

Temp. immediately after passing urine 103°F. Pulse 158.

In half an hour, further desire to micturate. Passed 2 or 3 e.c. only of tea coloured urine.

Restless. Abdomen very tympanitic. Soap enema, (child struggled wildly). A large *Ascaris* voided, but little faecal matter.

In afternoon another half ampoule of caffeine sodii, benzoate.

Death about 9 p.m. (twenty-four hours from onset of attack). Apparently due to heart failure. Post-mortem refused.

Parasite findings, thin film, taken 9 a.m. (12 hours after onset).

	Rings.	'Tenuis' Trophozoites.	Schizontes.	Gametocytes.	Per cent.
M. T. ..	21	7	..	..	26.7
B. T. ..	24	..	44	3	6
					73.3

Very noticeable were—

- (1) The large number of enlarged R. B. Cs. with no contained parasites, as if these had been washed off them.
- (2) Polymorphonuclears containing large blocks of round pigment such as is commonly seen in crescents. (Note: no M. T. gametocytes).
- (3) All parasites of both species undergoing plasmolysis and karyorrhexis, cytoplasm more degenerate than nuclei. Owing to the more delicate nature of the M. T. parasite this may make the count of the latter too low, but error is probably balanced by the empty enlarged R. B. Cs. which had certainly contained B. T. parasites.

The lysis acting on the blood seems to have been a lysis for the malaria parasites also. R. B. Cs. containing degenerating parasites were themselves in good condition, (achromia, of course, excepted).

The predominant infection in this case was certainly B. T.

II.

Malaria on the Open Line.

In the previous section conditions were dealt with under which very strict adherence to railway-owned land is not essential. Out in the wilds this is seldom so. In any case the average landholder will stretch a point if he understands the object is the control of *bokhar*. On the Raipur-Vizianagram Railway, for instance, 'non-interference with irrigation' was the only stipulation of Government in respect of power to go beyond the acquired land for anti-malaria purposes; at Saranda tunnel the Forest Department freely gave permission for the clearing of undergrowth and young trees for the short distance each side of a stream required for training and oiling the latter, but on the open line settled conditions and vested interests are encountered, especially around stations, (where alone anti-malaria work is usually required), which do really reduce the area on which anti-larval measures can be undertaken almost to the Euclidian straight line, but it is hoped that the accounts which follow of various works on the open line will show that even with this apparently insuperable obstacle enormous improvements can be affected.

1. *The Effect on a Division Terminal of Malarious Wayside Stations.*—Chakradharpur, in Chota Nagpur, 195 miles from Calcutta, is an engine-changing station and marshalling yard. The eastward run is to Kharagpur, 72 miles from Howrah, across fairly level country. The westward run is to Jharsuguda, on the boundary of Orissa and the Central Provinces, 125 miles, the route involving the crossing of the range at Saranda, the rest of the run being through heavily forested country, rich in mineral wealth besides, in which a heavy traffic originates. A further run from Chakradharpur is north-eastward to Adra in the Coalfields district.

Chakradharpur has a bad reputation for malaria among subordinates, though it is noteworthy that officers stationed there suffer little. It might easily be supposed that proper use of nets by the latter is the explanatory cause, but that this is not so will be shown.

In Table VIII the percentage malaria incidence among the staff and their dependants is given for one and three-quarter years, divided in respect of whether their duties take them on the line beyond station limits, (running staff, train crews), or confine them to the station and yards, (stationary staff). It will be seen that the incidence of malaria among

the running staff for 1925 is exactly twenty times as heavy as on the stationary staff, whilst an attack on a 'running' man results in thrice as long an incapacitation as on a 'stationary' man. In other words, the virulence of an attack on the former class is three times as great. As will be seen later, the

TABLE VIII.

Chakradharpur—Percentage Malaria Incidence.

Month.	Malaria to total sick- ness.	MALARIA ATTACKS PER CENT. OF --		Malaria sick days to total sick days.	DAYS LOST BY MALARIA PER MAN PER MONTH --	
		Stationary.	Running.		Stationary.	Running.
1925.						
January ..	35.6	0.43	6.7	74	0.24	0.64
February ..	29.6	0.41	4.5	64	0.13	0.44
March ..	38.9	0.67	5.2	58	0.18	0.49
April ..	25.4	0.29	5.9	42	0.12	0.45
May ..	17.9	0.29	1.9	12	0.05	0.08
June ..	22.7	0.17	5.9	32	0.10	0.44
July ..	26.7	0.21	7.1	36	0.13	0.43
August ..	26.4	0.43	5.2	41	0.19	0.49
September ..	25.0	0.09	8.2	41	0.18	0.63
October ..	38.4	0.48	11.2	65	0.22	0.94
November ..	32.5	0.24	11.2	50	0.26	0.81
December ..	33.0	0.33	6.3	40	0.17	0.50
TOTAL ..	29.5	0.33	6.6	46	0.17	0.52
1926.						
January ..	34.1	0.43	5.2	47	0.16	0.46
February ..	33.3	0.48	1.5	35	0.08	0.04
March ..	18.3	0.9	2.6	26	0.07	0.17
April ..	25.8	0.33	3.2	40	0.09	0.22
May ..	30.1	0.41	5.2	41	0.10	0.23
June ..	12.1	0.29	1.1	28	0.10	0.11
July ..	30.4	0.52	2.2	56	0.13	0.16
August ..	32.5	0.41	8.9	53	0.15	0.43
September ..	40.6	0.81	10.9	53	0.19	0.62

probable reason for this is that running staff attacks are largely matters of fresh infection, stationary, occasional relapses of old standing malaria.

It is of course arguable that the running staff's duties expose them far more to illness of all kinds, on account of the irregular hours and exposure their duties entail, but night work in the open in all weathers faces equally the yard employé, and I do not think the argument is sound. The real reason is that the duties of the running staff take them into places where they are constantly exposed to fresh infections of malaria.

Study of the Chakradharpur records showed that in every case of running staff reporting sick with malaria, there was an immediately previous history of night work on the west bound run. It would be tedious to give full instances; extracts from a month's records will suffice, confined entirely to cases where the previous and immediately subsequent duties of the men concerned render the locality and date of infection practically certain.* The agreement between the period elapsing between the presumed 'infective' run and the onset of the attack is too closely in agreement with the regular incubation period of malarial infection to be fortuitous, and I submit can be taken as proving that the runs tabulated were responsible for the ensuing attacks.

* Not re-published.

Absolute proof that Chakradharpur itself is not, and that the stations to the west emphatically are, malarious is furnished by the child spleen rates of the stations, and their adjacent villages, where present, on the fifty-three miles to Bisra, across the Saranda range. The writer's time on the railway terminating sooner than was expected, did not permit of the completion of the spleen rates up to Jharsuguda, but there are some notoriously malarious stations between Bisra and that place.

Spleen Rates, Chakradharpur to Bisra, B.-N. Railway Main Line.

TABLE IX.

Station.	Mile.	Month taken.	Per cent.	Average spleen.	REMARKS.
Chakradharpur.	194	November	5.9	0.09	
Lotapahar	200	November	4.3	0.06	
Sonua ..	207	November	2.8	0.08	
Goilkera	215	July ..	30.2	0.60	
Saranda	218	July ..	36.3	1.09	Station only, all races. Vide Table VI.
New Block Post.	220	July ..	43.7	1.28	Old Saranda figures, all races. Vide Table VI.
Posoita ..	225	November	85.7	1.57	
Manharpur.	232	September	27.3	0.67	
Jarail:ela	239	November	36.1	0.89	
Bisra ..	248	December	8.5	0.09	

It is sometimes maintained that it is hopeless to try and deal with malaria at wayside stations. The cost would be out of all proportion to the number of staff benefited. On the face of it this may be so, but when it is realised that these small stations, as in the instance of this division, are responsible for far more malaria than occurs among their own limited staffs, the matter assumes a different aspect. Moreover, as pointed out to the writer by the Chief Medical Officer of the Eastern Bengal Railway, malaria

falls especially heavily on the small station, the absence of a man off duty is more felt and occasions greater disorganisation—may be in main line train-working—than at larger stations, whilst relief is less easily obtainable.

In a length such as that under consideration, little or no benefits to the division point would accrue from clearing up one station, the whole sub-section from Goilkera to Manharpur at least would require taking up before any improvement would be seen. That this would be financially justifiable the account of what can be achieved at one station I think proves.

In regard to the problem of cleaning up the section Goilkera-Manharpur, very little interference with other than railway land is required, as per the following brief notes on the breeding places affecting each station:—*Goilkera*. The malaria arises from a stream crossing the railway east of the station, into which systems of borrow pits each side of the line drain, and from a swamp south-west of the station in which there are springs and *A. funestus*. Canalization of the stream from its head in several small ravines in the forest south-east of the station and the proper draining into it of the borrow pits, so that the whole can be oiled, is quite a simple matter. The swamp, which is the chief source of malaria affecting the down trains which stand for some time detaching their bank engines, and the returning bank engines waiting to enter on the single line section down to Manharpur, is likewise susceptible to drainage and oiling, or to subsoil drainage, though great improvement could be affected merely by putting it back under rice within the railway boundary.

Saranda.—Dealt with, as regards the station, in Part I of this paper. *New Block Post*, Mile 220. Until the culvert referred to in the description of old Saranda, which is almost directly beneath the site of this, is lowered, nothing can be done to ameliorate conditions here. Consequently one is driven back on to mosquito proofing the signal box cum living quarters, as on the Italian State Railways through the Roman campagna.

Posoita.—The badly connected borrow pits on each side of the station account for nearly all the malaria, causing the extraordinarily high spleen rate. Beyond that a little stream training and the improvement on the same lines of an irrigation channel in the rice field north of the station are all that is required.

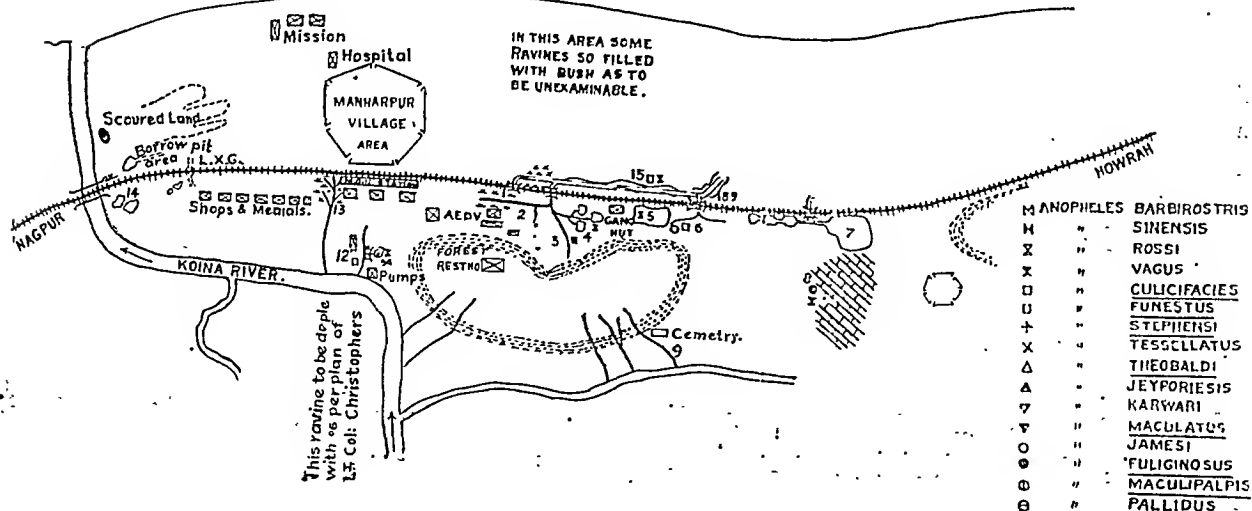
Manharpur.—The plan of the breeding places here, (Chart IV), should be consulted in apposition to the

CHART IV.

MANHARPUR STATION.

NOT TO SCALE.

S. KOEL RIVER.



plan in Christophers (1925). The work is simple. Owing to the bank engines stationed here this place is of greater importance than the remaining stations on this length.

Jaraikela.—The problem is almost identical with Posoita. The whole trouble arises from a series of badly connected borrow pits. Engineering plans in connection with further doubling contemplate the removal of this source of nuisance by a straight drain suitable from an anti-malaria point of view, easily oilable. Thus in this case anti-malaria operations are not properly chargeable with the work, though until doubling is carried out they may have to bear the cost.

The foregoing examples are instances, which every railway medical officer will be able to duplicate from his own experiences, in which railways are seen to be largely responsible for their own malaria. In the words of Sir Malcolm Watson, it is high time that engineers realized that "work which, without excuse, leaves a trail of malaria behind it is bad engineering." A most perfect example of this is considered in detail in the next section. There is no doubt that until an engineer's training teaches him to avoid creating breeding places in the course of his operations, medical departments will have to maintain a malariologist to prevent engineer-created ill health, and in any case to clean up behind the happenings of past years.

Apart from the capital cost, unestimated for, breeding could be controlled on the section Goilkera-Manharpur for about Rs. 600 monthly.

III.

A Malaria Campaign at an Open-Line Station.

At Amda Junction, in the Singbhum District, 182 miles from Howrah, a branch leaves the main line for the rich iron-ore district in the hills to the south. Forty-seven miles up this branch lies Dangoaposi, its local headquarters. Above this point the iron mines are served by several small branches and the grades become very heavy, so that full loads cannot be made up until the ore-waggons which form the bulk of the traffic have been marshalled into train loads at Dangoaposi, where there is therefore stationed a considerable locomotive and shunting staff.

The difficulties encountered during the construction of this branch, known as the 'Amda-Jamda' have been mentioned previously, and Dangoaposi was chosen as the local headquarters in preference to Noamundi, the succeeding station, as it had proved much more healthy than the latter during construction. The line was handed over for traffic early in 1925, but the local dispensary on open line schedule was not opened until March of that year, and hence no records are available for the first three months.

TABLE X.
Malaria Statistics—Dangoaposi.

Month.	Total Malaria Cases.	Total days lost.	Malaria, Stationary Staff and all dependants.	Per cent. of Stationary Staff attacked.	Days lost by Stationary Staff.	Days lost per man of Stationary Staff.	Malaria, Running Staff.	Per cent. of Running Staff attacked.	Days lost by Running Staff.	Days lost per man of Running Staff.
1925.										
April	53	36	39	19	..	..	14	100	36	2.57
May	51	53	29	15	33	0.46	20	143	22	1.57
June	38	101	28	13	18	0.25	10	71	83	15.93
July	60	109	47	23	56	0.78	13	93	53	3.79
August	143	410	111	54	195	2.71	32	227	215	15.36
September	168	477	128	62	146	2.03	40	287	331	23.64
October	145	505	114	55	130	1.81	31	221	375	25.36
November	75	237	53	25	9	0.12	22	157	228	16.29
December	42	161	30	14	63	0.88	12	86	98	7.00
TOTAL	775	2,089	579	29	650	8.92	194	154	1,441	111.51
1926.										
January	38	71	27	13	23	0.32	11	79	48	3.43
February	39	35	26	12	17	0.24	13	93	18	1.28
March	25	41	23	11	11	0.15	2	14	30	2.14
April	28	12	26	12	7	0.10	2	14	5	0.36
May	19	15	12	6	5	0.07	7	50	10	0.71
June	18	63	11	5	24	0.33	7	50	39	2.78
July	6	16	6	3	14	0.20	0	0	2	0.14
August	19	74	10	5	32	0.44	9	61	42	3.00
September	18	90	8	4	21	0.29	10	71	69	4.93
October	18	94	7	3	17	0.25	11	79	77	5.50
November	10	58	1	.5	4	0.05	9	64	54	3.85
December	6	30	1	.5	3	0.05	5	35	27	1.93
TOTAL	244	599	158	6 (p.m.)	178	2.49 (p.a.)	86	51 (p.m.)	421	30.05 (p.a.)

NOTES:—No figures available for January—March 1925. Anti-malaria measures taken from November 1925, p. m. = per mensem. p. a. = per annum. Total population of Railway Colony averages 220, composed of: Stationary Staff 72; Running Staff 14 (on average traffic); Dependants 134.

The site of Dangoaposi would strike even the practised observer as non-malarious to any considerable degree. The yard lies on a gently sloping hill side, not rising to any considerable extent north of the station, and imperceptibly grading on the south side into the valley bottom, mainly under rice. There is no forest within half a mile.

Things began to go wrong in August, when the line had been open for four months, with the onset of the monsoon. Within a few weeks conditions had become so bad that the station was almost at a standstill. There was one blackwater fatality, and when the writer arrived at the end of October there was hardly a single member of the staff who had escaped malaria, which was still raging with almost undiminished intensity. Relief men were doing most of the work and going down themselves. Table X shows the state of affairs, and indicate how complete was the disorganization owing to absences.

The spleen rate of fifty-four children in the railway settlement was 79.6 per cent., with an average enlargement of 2.22 finger-breadths, a very heavy figure. I attempted to correlate the amount of enlargement in these children with the number of attacks they were each stated by their parents to have undergone since the beginning of the previous July, i.e., for four months, and though the figures are very small, and in any case vitiated in the first class by several children who had recently arrived in the station with enormous spleens contracted elsewhere, they still indicate that a residence of over six months in the station had resulted in extremely heavy infections in each child.

TABLE XI.

Children—Effects of length of residence at Dongoaposi.

Residence in months, in class,	Number	Average enlargement (unweighted),	Number of attacks,
0-3	12	2.0	1.0
3-6	3	0	1.0
6-12	23	1.8	3.4
over 12	18	3.2	3.2

In Table XII are given the parasite findings in slides taken during my visit, (thin films only). Many of those found negative were taken during typical rigors, and yet no parasites were found. There was just enough quinine in use to spoil the blood films without doing any clinical good.

TABLE XII.

Parasite Findings—Dongoaposi.

Imported inhabitants:		Findings.	Hæmoglobin average
Number,			
12		Nil.	73%
7		B. T.	71%
4		M. T.	63%
		Found infected 48%.	
		B. T.	64%
		M. T.	36%
Local inhabitants.		Findings.	Hæmoglobin average
Number,			
6		Nil.	67%
1		B. T.	80%
1		M. T.	80%
		Found infected 25%.	
		Total found infected 42%.	

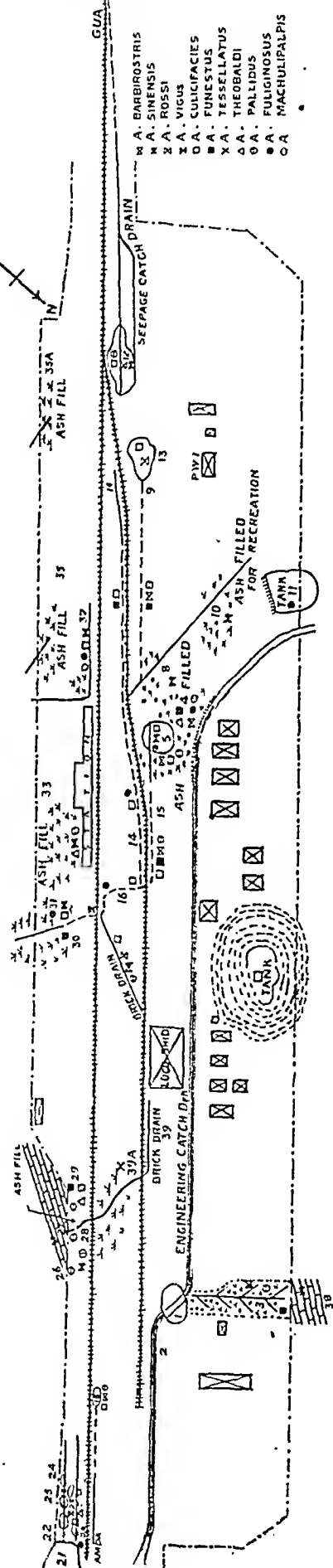
The local anopheline fauna numbers at least eleven species, of which the first ten were found during the original survey.

<i>A. sinensis.</i>	<i>A. theobaldi.</i>
<i>A. barbirostris.</i>	<i>A. maculipalpis.</i>
<i>A. culicifacies.</i>	<i>A. fuliginosus.</i>
<i>A. funestus.</i>	<i>A. pallidus.</i>
<i>A. rossi.</i>	<i>A. tessellatus.</i>
<i>A. vagus.</i>	

The various breeding places are shown on Chart V.

CHART V.

DANGOAPOSI STATION.



It will thus be seen that the locomotive department quarters at the east end of the yard were close to breeding places 3, 23, and 29, of which the first and last also affected the blocks of menials' quarters behind the loco. shed, but the main trouble was the interference caused by engineering works that had resulted in creating the system of running drains with swampy margins extending from No. 31 on the east to No. 14 on the west, and the two are as of shallow pools, Nos. 12 and 13, formed by seepage springs at the foot of cuttings.

Outside railway land no dangerous breeding was found, save in a small piece of rice field adjacent to breeding place No. 3, but the rice fields were full of *A. sinensis*. I have never encountered this common species in such profusion elsewhere.

Collections of adults in the quarters yielded the following species, most of the specimens being engorged:—

Locomotive Department, 6 blocks—

<i>A. sinensis</i>	..	..	27	56%
<i>A. barbirostris</i>	..	..	7	15%
<i>A. pallidus</i>	..	..	5	11%
<i>A. rossi</i>	..	..	3	6%
<i>A. fuliginosus</i>	..	..	2	4%
<i>A. culicifacies</i>	..	..	2	4%
<i>A. funestus</i>	..	..	2	4%
			48	

Traffic Department, 3 blocks—

<i>A. sinensis</i>	..	..	5	55%
<i>A. fuliginosus</i>	..	..	4	45%

Engineering Department, P. W. I. bungalow, 2 blocks—

<i>A. fuliginosus</i>	..	..	6	75%
<i>A. pallidus</i>	..	..	2	25%

The two engorged *funestus*, with mature eggs, indicating that the feed was at least their second, proved negative for parasites.

Ordinary mosquito nuisance was very great. The principal species were *Culex bitaniorhynchus* and one of the *vishnui*-group. One *Stegomyia albopicta* was taken in the P. W. I.'s bungalow.

Before any regular preventive measures could be attempted it was necessary to combat the existing outbreak and get the station working again. As the campaign is not without its instructive side, it is next described.

The running drains were oiled without training by soaked swabs, which did away with a large proportion of the larvæ, whilst the seepage pools Nos. 12 and 13 were roughly drained out as far as possible, and the residual water oiled by hand sprinkling from a bucket. These pools were, when found, literally black round their margins with *culicifacies* larvæ.

Having thus cut off the main supply of anophelines, measures were taken to deal with those already in the adult state and to control the developed disease. For the former, all that could be done, but it was very effective, was to cut down the monsoon growth of shrubs, (mainly *Crotolaria*), which covered the land around the quarters to a height of two to three feet. This abolished the chief day-time resting place of the anophelines. Those already in the houses and presumably infected to a considerable extent, could not be touched with the apparatus and staff available. There were far too many sick in the quarters to contemplate evacuation and fumigation.

For the second, regular medication of everyone was attempted; and this brought out some interesting points.

Prior to my arrival on the scene of the epidemic, the medical officer of the district had of course paid as many visits as the other calls on his time permitted of. Grains xv. quinine sulphate in solution twice weekly had been ordered, subsequently changed to gr. x at more frequent intervals. This was supposed to be being dealt round to everyone by the sub-assistant surgeon and his compounder. Investigation of the dispensary books showed that on the quinine consumption therein recorded, no more than thirty-six doses per diem had been issued among a population of over two hundred during the previous six weeks. Like most of his class, the sub-assistant surgeon, unable to get the people for treatment at his dispensary without much trouble, had failed to organize a *bandobast* for reaching them with his medicines.

In the first place, a complete census by name and house of all in the station had to be drawn up. This being done, a check was available. I do not think that prior to this being made, anyone realized nearly how many persons there were in the settlement. Thereupon medication was started with the following mixture, prescribed by the Acting Chief Medical Officer:—

<i>Cinchona febrifuge</i>	..	..	gr. x.
<i>Acid citrici</i>	..	..	gr. xx.
<i>Mag. sulph.</i>	..	..	gr. xx.
<i>Spt. anisi</i>	..	..	m. x.
<i>Syr. simplex.</i>	..	..	m. xx.

Aq. ad to 1 oz.

This was sent up in bottles from the Medical Stores to obviate further work on the spot, as the compounder was the victim of frequent attacks, though never failing to revert to duty as soon after as he was able.

Naturally an officer has many advantages over a subordinate in attempting to organize anything affecting more than one department. With my assistant, an assistant surgeon, there were thus three of the Medical Department on the spot. At my instance the local heads of other departments, the Traffic Inspector, (acting for the Station-master, in hospital), the Loco. Foreman and the Permanent Way Inspector were summoned and on the first evening after the arrival of the febrifuge mixture an attempt was made to administer a dose to all in the settlement. The work took two and a half hours after the close of the day's normal duties for all of them, extending to long after dark, but in this time only 143 doses were given. The remainder of the population could not be found or were out on the line. No opposition was encountered at the time, but on the following morning there was a general complaint of vomiting and excessive purgation. *Mag. sulph.* in the mixture was cut down to gr. x. in subsequent consignments. In any case there is no doubt that the mixture was given at an unsuitable hour, when most of the inhabitants were cooking, or had just consumed their evening meal. It was manifestly impossible to wait for two hours after all had eaten, as by then the majority would then have been fast asleep.

The next two nights I attempted to get everyone except purdah women together at the hospital, leaving the latter for the sub-assistant surgeon to deal with by house-to-house visiting. Even after long delays whilst absentees, who had been seen by some one or other, were sent for, the medication roll was incomplete when checked against the census. Finally, to give the dose at a more suitable time, well before a meal, special orders were issued. Thereafter it is estimated that about 90 per cent. of the inhabitants were reached daily. Short of absolute military discipline I doubt if better results are obtainable. Epidemics of this nature emphatically require a medical officer in charge, yet what

railway medical department has an officer available to give his whole time to such? An epidemic in one place is invariably associated with a general exacerbation of the disease all over a district, and the M. O. thereof cannot possibly devote his whole time even to the place worst affected. Hence the inordinate delay in getting the traffic moving again which characterises these outbreaks when they affect important centres. Within the last three years at least three of the largest railways in this country have experienced similar outbreaks, all of them on a large scale, affecting more important division points than the one here described.

The permanent anti-malaria scheme is shown in Chart V. This was carried out in the first six months of 1926, to be ready for the subsequent monsoon. Its results are apparent from a study of Table X. The success achieved was most striking, for malaria almost ceased to exist at Dangoaposi. It is of course highly probable that in any case the following year would not have shown such extremely high incidence as 1926,—though the way in which *culicifacies* started to breed in one place where the first week's oiling after the onset of the rains was omitted makes this not too certain.

Up to the time when the writer left the railway the capital cost of the scheme was not available, and in any case the works carried out included many points, such as the final tidying up of the yard and ash filling instead of draining swamps to make a recreation ground, which are not properly chargeable to malaria works. The original estimate was about Rs. 18,000, being the capitalized 1925 loss on sick pay alone, at eight years' purchase, but this included subsoil piping breeding place No. 12, which was not done owing to the layout of the yard being incomplete and liable to change, and the engineers very rightly not wanting to have tracks on the top of a pipe line which might want lifting and relaying, so its place was taken by an open drains system and oiling, at least *pro. tem.* Probably half of the above sum is actually debitable to anti-malaria operations direct. In addition, the upkeep charge in 1926 averaged Rs. 28 weekly for 23 weeks until the various waters dried up just before Christmas, or Rs. 624 in all. I think the reduction amply justifies the outlay and proves the financial as well as the scientific practicability of control at stations on open lines.

There is no doubt that the remaining three stations to the terminus at Gua are entirely responsible for this, as there is little malaria at stations lower down the branch or at Amda Junction, the booking-off place on the northward runs. Malaria will not disappear from Dangoaposi until Noamundi, Jamda and Gua and the end points of the various ore branches are dealt with, and will assume an increasingly serious aspect as regards the running staff as traffic develops. An interesting point thus brought out is the greater virulence of these attacks, mainly fresh infections, compared with the occasional relapses of the stationary staff.* For example, attack cost a running man 5.5 days' absence in October 1926, as compared with 0.25 days for a relapse in a stationary man. The virulence of these presumably fresh infections was thus twenty-two times greater than a relapse, as measured by their incapacitating effect.

III.

The Importance of Borrow Pits.

On page 61 it was stated that these, when freshly excavated, bred only *A. rossi* and *A. vagus*, according to locality. It now remains to consider what part they play in malaria causation when old and full of vegetation, as is their general condition on the open line.

The ordinary borrow pit contains standing water. It is exceptional to find them connected for drainage purposes. When this has been done, and badly done, as appears to be the inevitable rule, they really become pools in a stream, and, as left by the engineers are definitely dangerous, producing mainly *A. funestus*.

Standing water borrow pits, even when there was no possible chance of seepage springs altering their usual character, I have found to contain the following species:—

A. barbirostris.
A. sinensis.
A. culicifacies.
A. funestus.
A. rossi.
A. vagus.
A. fuliginosus.
A. pallidus.

The third and fourth on the list are definitely dangerous malaria carriers.

TABLE XIII.

Spleen Rates, Dangoaposi.

Date.	N.	V ⁰ .	V ¹ .	V ² .	V ³ .	V ⁴ .	V ⁵ .	V ⁶ .	V ⁷ .	%	u.
1st November, 1925 ..	54	11	11	12	6	4	9	1	0	79.6	2.22
31st October, 1926 ..	34	23	5	2	4	0	0	0	0	32.2	0.62

The oiling and maintenance was placed under the sub-assistant surgeon, who had a special gang of six coolies during the rains for this and keeping jungle growth down. Occasional visits were paid by the European sanitary inspector stationed at Saranda tunnel works.

Table XIII gives the spleen rates in detail during the 1925 epidemic and a year subsequently. The figures are eloquent of the improvement.

The figures in Table X shows that the running staff are still contracting malaria, another instance of the point made in the preceding section of the importance of dealing with small stations.

There is as yet an unexplained sporadicity in regard to the appearance of *A. funestus* in borrow pits of the ordinary type. It is only occasionally that one finds this species, and it is then invariably associated with

* Very few transfers to and from Dangoaposi occurred during the year 1926. Such as occurred were mainly among drivers, which further proves my point. One or two regular cases of malaria among the stationary staff were traced to aboriginal (Ho) members of the staff living in villages near the station but beyond the protected area. Quarters being available, these men were forced to live in them.

very clear water, but that of itself tells nothing. In railway malaria work, when borrow pits exist within the 'warning' signal at each end of a station, they should be kept marginally clear of all vegetation, and only line fishing, not netting, permitted in them. If possible, they should be filled up. At any station with a water column, fire cleaning results in a gradual accumulation of ashes that are usually available for the slow but almost costless carrying out of this work. If ashes are dumped into pits daily, poisonous substances seem to leach out of them which have an inhibitory effect on breeding.

APPENDIX IV.

The Position of A. fuliginosus as a Carrier.

Though this species is a proved malaria carrier in Nature, it appears to have little or no practical importance in this respect.

An instance when it was neglected with complete success is given in respect of Artham Base Camp, (Chart II), in the first section of this paper. Likewise it was not attacked in tank No. 11 at Dangoaposi, (Chart V), again without ill results. At Santragachi, the B. N. Railway Locomotive and Carriage sheds five miles from Howrah, though there is a certain amount of malaria, this species does not appear in numbers until after the annual peak of the curve is well on the down grade. In January 1926 it formed 93 per cent. of all anophelines taken in the quarters at this station, and yet malaria incidence at the time was as low as it ever is there.

A probable explanation is that, being a species with winter maximum, temperature factors are unfavourable to sporozoite development, but this hypothesis hardly suffices in the Northern Circars, for instance, and it would appear probable that the susceptibility to infection is extremely low. Work on this point is urgently required. If this species has any practical importance, then mosquito malaria control in Bengal becomes a virtual impossibility, but all the available evidence, as stated above, is the other way.

In conclusion I wish to express my thanks to my former Assistant, Assistant Surgeon Adhikari of the B. N. Railway, who is responsible for a large proportion of the spleen rates included in this paper, and to Assistant Surgeon Chowdhury, B. N. Railway, in medical charge of District I of the Raipur-Vizianagram Construction, for keeping up the study of blood films in his district at times when the writer and his assistant were absent elsewhere.

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A SIMPLIFIED METHOD FOR ESTIMATION OF SUGAR IN THE BLOOD.

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(December 1927).

THAT normal blood contains sugar has been known from the time of Claude Bernard, and since then numerous methods have been devised by workers all over the world for estimating its amount, many of these being obsolete now. Formerly, the estimation of sugar in blood used to be a tedious procedure; but nowadays it is a much more simple process. But even so, nearly all the methods for blood-sugar estimation require a well-fitted laboratory and a fairly well-trained worker to carry out the test.

The importance of blood-sugar has increased enormously since the insulin treatment has come into use. All cases of diabetes undergoing insulin treatment require periodical, sometimes daily examination of the blood-sugar. In large cities like Calcutta, with well-equipped hospitals and laboratories with trained workers in them, this is possible; but what about the distant mofussil towns and villages, in some of which places even a qualified medical man is often wanting?

A doctor in such a place is very much handicapped in treating a case of diabetes with insulin, not being able to get any idea of what the initial blood-sugar level is and also what changes take place in the blood-sugar during insulin treatment. It has been suggested that where blood-sugar estimation is not possible, insulin treatment can be carried on by relying on the urinary sugar only. To my mind, this appears to be an unsound and sometimes a dangerous procedure. I have seen a few cases of renal glycosuria treated with insulin, with results just short of a disaster. Even in a case of diabetes, one does not get a clear indication about the proper dose of insulin to be injected and also about the interval of time between injections, without a knowledge of the patient's blood-sugar, and this is essential for the successful treatment of diabetes mellitus. To give too small a dose of insulin and at too long intervals will not do much good to the patient, and to give an overdose of insulin, on the other hand, may mean disaster.

We know that the urine may become sugar-free but the blood-sugar may still be 50 per cent. higher than normal. Insulin injections are usually stopped at this stage for fear of inducing hypo-glycæmia by those who take the urinary sugar as the only guide; but the blood still being in the hyper-glycæmic state, the pancreas does not get sufficient rest, and so the ultimate results of such treatment are often unsatisfactory. The fundamental principle of treatment of all cases of diabetes is to take as much strain from the

pancreas as practicable and this is only possible when the blood-sugar is kept at a normal level. In my opinion, the insulin treatment of diabetes ought not to be done without regular blood-sugar tests being made, unless of course the case is one of urgency, and this too must be done very cautiously.

In order to help practitioners in mofussil towns and villages to successfully carry out insulin treatment by regular blood-sugar tests, I have been trying for some time past to devise a simplified method for the estimation of the sugar content of blood, which will be fairly accurate for clinical purposes and at the same time easy and quick for the busy practitioners to carry out the test. Such a test has now been devised, and controls by authenticated blood-sugar methods show the results are accurate up to the second place of decimals. A detailed description of the method is given below.

Author's Simplified method for blood-sugar estimation.

Apparatus required:—(in detail).

One test-tube rack.
One glass tube, for oxalated blood (method given in detail).

A few test-tubes.—Size 4 in. \times $\frac{1}{2}$ in. for collecting oxalated blood.

A few extraction tubes, size 2 in \times $\frac{3}{4}$ in. for extracting blood in distilled water.

One 10 c.c. pipette divided into 1|10ths, for measuring distilled water.

One 1 c.c. pipette divided into 1|100ths, for measuring blood.

Two 1 c.c. pipettes divided into 1|10ths, for measuring out the two precipitating reagents.

Small glass rods for stirring up the blood after precipitation.

Small funnels. For filtration of blood after precipitation.

Filter paper (Ordinary—5.5 cm.)

Two 1 c.c. pipettes with one mark only. One for making the diluted standard glucose, and the other for measuring out diluted standard glucose for experiments.

One 50 c.c. measuring flask, for making standard glucose.

Two special 30 c.c. graduated tubes, for boiling the blood filtrate and the glucose control with copper solution.

Three 2 c.c. pipettes with 1 mark only—Two for measuring out the copper solution and the phosphomolybdic acid, and one for measuring out the blood filtrate.

Copper water bath for boiling.

Spirit lamp.

Comparator.

Reagents:—

Powdered potassium oxalate (neutral).

Sodium tungstate (pure cryst.)—10 per cent. solution.

Acid sulphuric—2|3 N.

Grape sugar tablets. (Merck)—each 0.25 gm., making

stock standard glucose solution.

Toluol—for preserving the stock standard glucose solution.

Alkaline copper solution.

Phosphomolybdic acid.

Distilled water.

The Alkaline Copper solution is made up as follows:

Sodium Carbonate (anhydrous) .. 40 gms.

Acid Tartaric (Pure) .. 7.5 gms.

Copper Sulphate (Pure cryst) ... 4.5 gms.

The sodium carbonate is dissolved in about 400 c.c. of distilled water in a litre flask; warming of the solution on a water bath may be necessary. The copper sulphate is dissolved separately and added to the carbonate solution with shaking. Finally, the tartaric acid is dissolved in a separate beaker and added to the flask. The receptacles in which the copper sulphate and the tartaric acid are dissolved must be repeatedly washed with distilled water and the washings added to the flask. When cool, distilled water should be added and the solution made up to a litre. It should then be filtered if necessary and bottled.

Phosphomolybdic Acid Solution:—

Acid molybdic (Pure—free from ammonia) 35 gms.

Acid phosphoric (Pure—85 per cent.) .. 125 c.c.

Sodium hydroxide (Pure—10 per cent. solution) 200

c.c.

Dissolve 35 grammes of pure molybdic acid in 200 c.c. of 10 per cent. sodium hydroxide solution and add 200 c.c. of distilled water. Boil until all traces of ammonia are driven off. (This can be tested by presenting a glass rod dipped in pure hydrochloric acid); cool, and add 125 c.c. of phosphoric acid (85 per cent.) When sufficiently cold, make up to 500 c.c. with distilled water.

(N.B.—This solution should be of such a strength that 2 c.c. of this will completely discharge the blue colour from 2 c.c. of the alkaline copper solution. It is advisable to test these reagents occasionally and to make blank experiments with them from time to time.)

Stock solution of glucose 1 per cent.

The stock solution of glucose can be conveniently made up by taking two glucose tablets, each 0.25 gm., and dissolving these in 50 c.c. of distilled water in the 50 c.c. flask. This is bottled and preserved with a few drops of toluol, which should form a thin layer on the surface of the solution. This stock solution should be checked now and then as regards the sugar content by Fehling's or Benedict's method.

Diluted glucose solution:—

To make the diluted standard for experiment, take 1 c.c. of the stock solution in a 1 c.c. pipette and make it up to 50 c.c. with distilled water in the measuring flask, which must be washed clean with distilled water. This should be made up fresh every time.

1 c.c. of this diluted standard solution contains 0.2 mgm. of glucose.

Method of estimation.

With the usual aseptic precautions, draw $\frac{1}{2}$ to 1 c.c. of blood from the vein of the patient. With a little practice, this small amount of blood can also be collected from a deep finger prick. For this the patient should be instructed to dip the hand in hot water and after thorough drying, to swing the arm vigorously, backwards and forwards for a little time. A thin rubber tubing is then wound round the finger tightly, and after sterilizing with ether, the portion of the finger just below the bed of the nail is then smartly jabbed with a sterilized sharp surgical needle. By squeezing the finger 0.5 c.c. of blood can easily be obtained. Collect the blood directly into an oxalated tube.*

In an extraction tube measure out 3 c.c. of distilled water by means of the graduated 10 c.c. pipette. Accurately measure out 0.2 c.c. of blood by means of the finely graduated 1 c.c. pipette.

*The easiest way of preparing an oxalated tube is to blow inside the test tube with a glass tube and then to sprinkle some finely powdered neutral potassium oxalate inside. The inner walls of the tube thus becoming moist through blowing; the oxalate will stick to the sides in a uniform layer.

(divided 1/100ths) and deliver it into the extraction tube. Shake lightly and wait till all the corpuscles become laked and the solution becomes clear red (Plate I A).

Now add 0.4 c.c. of 10 per cent. sodium tungstate solution, followed immediately by 0.4 c.c. of 2/3 N sulphuric acid, by means of the two ordinary graduated 1 c.c. pipettes (divided 1/10ths) and stir with a glass rod. The addition of sodium tungstate and sulphuric acid precipitates the protein and the colouring matter of the blood. The precipitate is reddish at first, but soon turns viscous and becomes of a greyish brown colour (Plate I B).

When the precipitation is complete, the solution is filtered through a small filter paper. The filtrate obtained should be crystal clear. For the estimation, measure out 2 c.c. of the clear filtrate into the special graduated 30 c.c. tube by means of a 2 c.c. pipette. Mark this tube with "U" (unknown). Into another 30 c.c. graduated tube take 1 c.c. of the *diluted standard glucose solution* by means of another 1 c.c. pipette with one mark, and add 1 c.c. of distilled water to it. Mark this as "S" (standard). Now add 2 c.c. of the alkaline copper solution to each of these two tubes by means of a 2 c.c. pipette. Shake the two tubes by gently stroking the bottom of the tubes against the palm of the hand.

The two tubes are now introduced into the copper bath in which water is already boiling and allowed to remain there for 10 minutes. They are then removed from the bath, and the contents will be found to be of bluish solution with a reddish brown precipitate of cuprous oxide at the bottom of the tube: 2 c.c. of phosphomolybdic acid solution are then immediately added to each of the two tubes by means of a 2 c.c. pipette. A brisk effervescence occurs and the solutions in the two tubes turn deep blue. (Plates I, C & D). Phosphomolybdic acid, as has already been stated, discharges the blue colour of *unreduced* copper solution; but here it will deepen the colour by combining with the *reduced* copper oxide. The intensity of the blue colour developed is directly proportional to the amount of reduced copper present, which again is dependent on the amount of the sugar present. Shake the two tubes by slightly inclining the tubes and tapping the bottom against the palm of the hand.

Now put these two tubes inside the "Comparator" (Fig. I), and add distilled water very carefully to the tube having a deeper colour—either the 'standard' or the 'unknown,' in whichever tube the colour of the solution is deeper. Dilution with water is carried on until the two solutions are matched in colour exactly. (Plates I, E & F). After addition of distilled water each time mix the contents thoroughly by putting in the cork and inverting the tube.

Calculation.

It has already been mentioned that the intensity of the blue colour after addition of phosphomolybdic acid depends on the amount of the

reduced copper present, which in its turn is proportional to the amount of sugar present in the two tubes.

Now when the solutions in the two tubes are exactly matched in colour, it may be assumed that the concentration of sugar in both of them is the same, but the quantity of sugar present in each will vary in direct proportion to the respective volumes of the solutions. In the present case the solution in the tube marked "S" is known to contain 0.2 mgm., of sugar, and from this data, the amount of sugar in the other is easily found out by calculation.

Let us take a concrete example. Let us suppose that the solution in the "standard" tube is deeper in colour and had to be diluted up to 12 c.c. to match exactly in colour with the 6 c.c. of the solution in the unknown tube. Here although the concentration of sugar in the two solutions is the same, the quantity of sugar present in the standard tube is double what is present in the "unknown" tube, the quantity being directly proportional to the volumes of the solutions contained in the two tubes.

We know that the 12 c.c. of the solution in the "standard" tube contains 0.2 mgm. of glucose. Therefore, the sugar content of the 6 c.c. of the solution in the 'unknown' is half, i.e., 0.1 mgm.

The proportional contents of the sugar in the unknown solution is thus readily calculated by simple rule of three.

Standard.	Unknown.	Strength of glucose.
12 c.c. :	6 c.c. ::	0.2 mgm. : x
$\therefore x = \frac{6 \times 0.2 \text{ mgm.}}{12} = 0.100 \text{ mgm.}$		

Now it will be remembered that originally 0.2 c.c. of blood was taken for experiment and was made up to a total volume of 4 c.c.; after filtration, only 2 c.c. were taken for estimation. Therefore, the quantity of blood actually taken for experiment was 0.1 c.c.

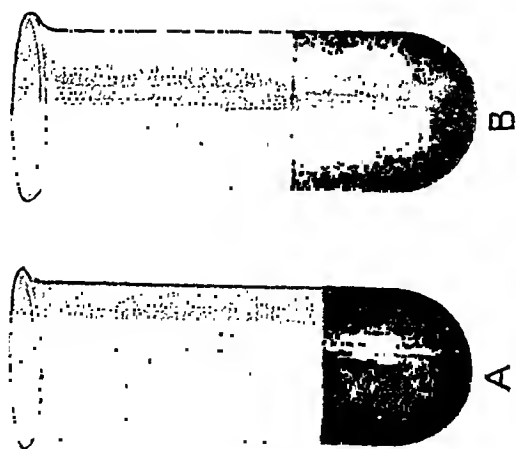
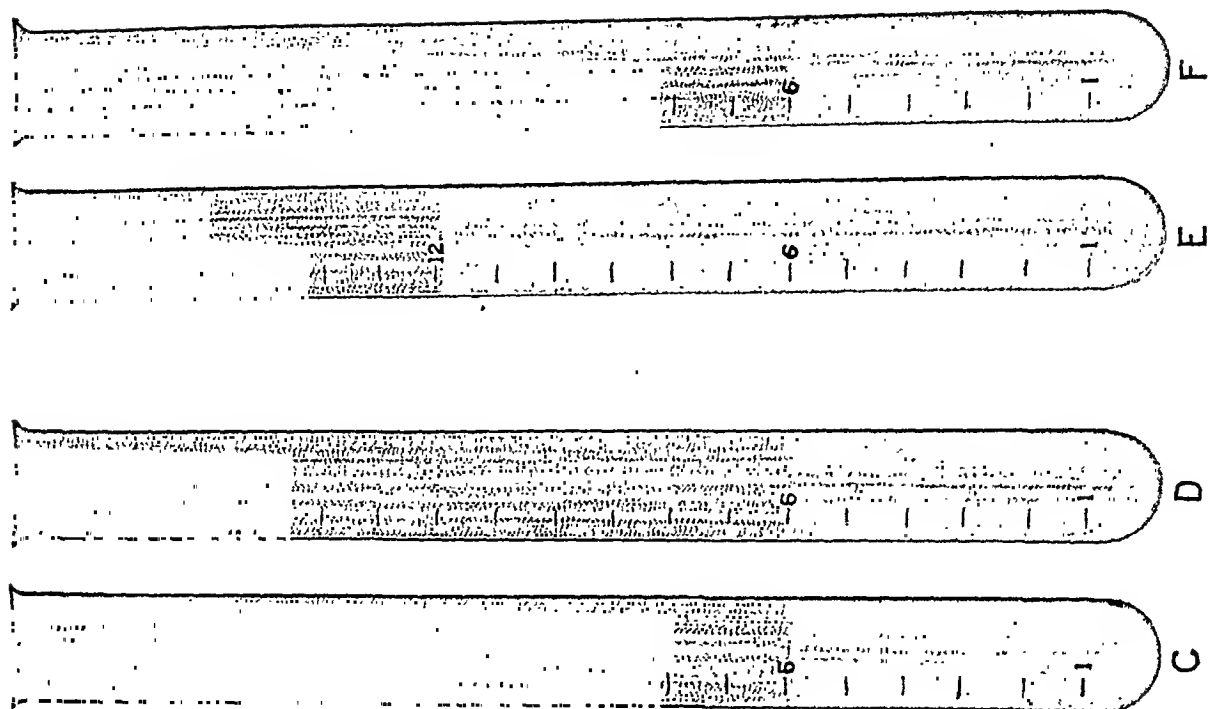
Now if 0.1 c.c. of blood contains 0.1 mgm. of sugar, 100 c.c. of blood will contain 100 mgm. which is equivalent to 0.100 gram (per cent.).

Now supposing that the solution in the "unknown" tube is deeper in colour and has to be diluted to 8 c.c. to match in colour with the solution in the "standard" tube. As the quantity of sugar in the two solutions will be proportional to their respective volumes, and as the 6 c.c. of the "standard" solution contains 0.2 mgm. of glucose, the amount contained in the 8 c.c. of the unknown solution can be found out as follows:—

Standard.	Unknown.	Strength of glucose.
6 c.c. :	8 c.c. ::	0.2 mgm. : x
$\therefore x = \frac{8 \times 0.2 \text{ mg.}}{6} = 0.266 \text{ mgm.}$		

Now 0.1 c.c. of blood contains 0.266 milligram of glucose. Therefore, 100 c.c. of blood will contain 266 milligrams which is equivalent to 0.266 gram (per cent.).

PLATE I.



For easy calculation I have worked out a table which will give the results at a glance. Simply note the readings of the standard and that of the unknown in c.c.s and find out from the table the percentage of blood-sugar at once without going into calculations.

For the sake of convenience, the various steps in the estimation of blood-sugar may be summarized as follows:—

(1) Take 3.0 c.c. of distilled water in an extraction tube.

(2) Measure out 0.2 c.c. of the oxalated blood and add it to the distilled water (Plate I, A).

(3) Add 0.4 c.c. of 10 per cent. sodium tungstate, immediately followed by 0.4 c.c. of 2/3 N sulphuric acid in the extraction tube containing blood. Stir with a glass rod (Plate I, B).

(4) Filter into another extraction tube.

(5) Into a special 30 c.c. graduated tube take 1 c.c. of the diluted glucose solution containing 0.2 mgm. of glucose, and add 1 c.c. of distilled water to it. Mark this as "Standard." Into another similar tube, take 2 c.c. of the blood filtrate. Mark this as "Unknown." Add 2 c.c. of the alkaline copper solution in each of these two tubes. Shake.

(6) Put both these tubes in the boiling water bath for 10 minutes.

(7) Take the two tubes out of the boiling water bath and add 2 c.c. of phosphomolybdic acid to each. The two solutions turn blue. Shake by gently stroking the bottom of the tubes against the palm of the hand (Plates I, C & D).

(8) Put the two tubes inside the "comparator" (Fig. I) and very carefully add distilled water to the deeper coloured solution till the colours in the two tubes exactly match each other (Plates I, E & F).

(9) Take the readings in the two tubes in c.c. and calculate or read the results directly from the table.

TABLE I.

(Strength of glucose. — 0.2 mgm. per c.c.)
Solution in "standard" tube diluted:—

Reading in "Standard" tube in c.c.s.	Reading in "Unknown" tube in c.c.s.	Result (Percentage).
6.0	6.0	0.200
6.1	6.0	0.196
6.2	6.0	0.193
6.3	6.0	0.191
6.4	6.0	0.187
6.5	6.0	0.184
6.6	6.0	0.182
6.7	6.0	0.179
6.8	6.0	0.176
6.9	6.0	0.174
7.0	6.0	0.171
7.1	6.0	0.169
7.2	6.0	0.167
7.3	6.0	0.164
7.4	6.0	0.162
7.5	6.0	0.160
7.6	6.0	0.158
7.7	6.0	0.156
7.8	6.0	0.154

TABLE I—contd.

7.9	6.0	0.152
8.0	6.0	0.150
8.1	6.0	0.148
8.2	6.0	0.146
8.3	6.0	0.144
8.4	6.0	0.143
8.5	6.0	0.141
8.6	6.0	0.139
8.7	6.0	0.138
8.8	6.0	0.136
8.9	6.0	0.135
9.0	6.0	0.133
9.1	6.0	0.132
9.2	6.0	0.130
9.3	6.0	0.129
9.4	6.0	0.127
9.5	6.0	0.126
9.6	6.0	0.125
9.7	6.0	0.123
9.8	6.0	0.122
9.9	6.0	0.121
10.0	6.0	0.120
10.1	6.0	0.119
10.2	6.0	0.118
10.3	6.0	0.116
10.4	6.0	0.115
10.5	6.0	0.114
10.6	6.0	0.113
10.7	6.0	0.112
10.8	6.0	0.111
10.9	6.0	0.110
11.0	6.0	0.109
11.1	6.0	0.108
11.2	6.0	0.107
11.3	6.0	0.106
11.4	6.0	0.105
11.5	6.0	0.104
11.6	6.0	0.103
11.7	6.0	0.102
11.8	6.0	0.101
12.0	6.0	0.100
12.1	6.0	0.099
12.2	6.0	0.098
12.3	6.0	0.097
12.5	6.0	0.096
12.6	6.0	0.095
12.7	6.0	0.094
12.9	6.0	0.093
13.0	6.0	0.092
13.1	6.0	0.091
13.3	6.0	0.090
13.4	6.0	0.089
13.6	6.0	0.088
13.8	6.0	0.087
14.0	6.0	0.086
14.1	6.0	0.085
14.3	6.0	0.084
14.5	6.0	0.083
14.7	6.0	0.082
14.8	6.0	0.081
15.0	6.0	0.080
15.2	6.0	0.079
15.4	6.0	0.078
15.6	6.0	0.077
15.8	6.0	0.076
16.0	6.0	0.075
16.2	6.0	0.074
16.4	6.0	0.073
16.6	6.0	0.072
16.9	6.0	0.071
17.1	6.0	0.070
17.4	6.0	0.069
17.7	6.0	0.068
18.0	6.0	0.067
18.2	6.0	0.066
18.5	6.0	0.065
18.8	6.0	0.064
19.1	6.0	0.063
19.4	6.0	0.062
19.7	6.0	0.061
20.0	6.0	0.060

TABLE II.
(Strength of glucose. — 0.2 mgm. per c.c.)
Solution in "Unknown" tube diluted:—

Reading in "Standard" tube in c.c.s.	Reading in "Unknown" tube in c.c.s.	Result (Percentage).
6.0	6.0	0.200
6.0	6.1	0.203
6.0	6.2	0.206
6.0	6.3	0.210
6.0	6.4	0.213
6.0	6.5	0.216
6.0	6.6	0.220
6.0	6.7	0.223
6.0	6.8	0.226
6.0	6.9	0.230
6.0	7.0	0.233
6.0	7.1	0.236
6.0	7.2	0.240
6.0	7.3	0.243
6.0	7.4	0.246
6.0	7.5	0.250
6.0	7.6	0.253
6.0	7.7	0.256
6.0	7.8	0.260
6.0	7.9	0.263
6.0	8.0	0.266
6.0	8.1	0.270
6.0	8.2	0.273
6.0	8.3	0.276
6.0	8.4	0.280
6.0	8.5	0.283
6.0	8.6	0.286
6.0	8.7	0.290
6.0	8.8	0.293
6.0	8.9	0.296
6.0	9.0	0.300
6.0	9.1	0.303
6.0	9.2	0.306
6.0	9.3	0.310
6.0	9.4	0.313
6.0	9.5	0.316
6.0	9.6	0.320
6.0	9.7	0.323
6.0	9.8	0.326
6.0	9.9	0.330
6.0	10.0	0.333
6.0	10.1	0.336
6.0	10.2	0.340
6.0	10.3	0.343
6.0	10.4	0.346
6.0	10.5	0.350
6.0	10.6	0.353
6.0	10.7	0.356
6.0	10.8	0.360
6.0	10.9	0.363
6.0	11.0	0.366
6.0	11.1	0.370
6.0	11.2	0.373
6.0	11.3	0.376
6.0	11.4	0.380
6.0	11.5	0.383
6.0	11.6	0.386
6.0	11.7	0.390
6.0	11.8	0.393
6.0	11.9	0.396
6.0	12.0	0.400

A NOTE ON STABILITY OF SOLUTIONS OF CALCIUM HYPOCHLORITE IN- TENDED FOR USE IN SNAKE BITE.

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LIEUT.-COL., I.M.S.,

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The use of injections of 2 per cent. solutions
of hypochlorite of lime and calcium hypochlorite

has been recommended by Calmette for immediate treatment in snake bite. He states that those solutions are effective and possess the advantage of not producing severe local destructive effects. It was suggested that outfits of ampoules containing hypochlorite solution might be useful for those exposed to the danger of snake bite, which would have the advantage of being cheap and easily replaced.

The question of the stability of such solutions under ordinary conditions arose and it was considered worth while to investigate this point. Solutions of calcium hypochlorite of approximately two per cent. available chlorine were kept for over one year and tested at intervals.

The following solutions were tested:—

I. A solution in amber coloured ampoules, sealed and kept in the dark and in the cool room at about 70°F.

II. A solution in amber coloured ampoules, sealed and kept in the laboratory at room temperature.

III. A solution in amber coloured ampoules, to which had been added N/10 sodium hydrate in the proportion of 1 to 10 of the hypochlorite, and kept in the laboratory at room temperature.

IV. Colourless ampoules of the same solution to which N/10 alkali had been added in the proportion of 1 to 10, and kept in the laboratory under ordinary conditions.

V. Colourless ampoules filled with a stronger solution (2.7 per cent. of available chlorine) and kept in the laboratory under ordinary conditions.

These solutions were periodically tested and the results of the test are shown in the table below:—

Specimen I lost about 5.5 per cent. of its original strength.

Specimen II lost over 50 per cent. of its original strength.

Specimen III lost over 50 per cent. of its original strength.

Specimen IV lost all of its original strength.

Specimen V lost all of its original strength.

These represent losses after storage for over one year. Under conditions of specimen I, the solution will keep with very little loss of strength under ordinary conditions; the addition of a small amount of alkali increases its keeping qualities to a slight extent.

The advantage of issuing in amber coloured ampoules is very marked.

The practical conclusion is that calcium hypochlorite solution stored in amber coloured ampoules and kept in a dark cold room will keep well, whereas the same solution under ordinary conditions would be likely to lose half its strength after one year, the addition of a small quantity of alkali being slightly advantageous. Ordinary glass ampoules are useless. It would be possible to make outfits of ampoules of hypochlorite solution for those exposed to the danger of snake bite, and if they were replaced at short intervals there could be at hand a remedy cheaper and

more effective than anything short of antivenene. The examinations of the solutions were carried out by Mr. Nani Lal Banerji, A.I.C., Assistant

These inoculations were given in February, August, and October; and chiefly to medical men and assistants and the menials who actually

A study of the stability of Calcium Hypochlorite solution under different conditions.

Date.	I.	II.	III.	IV.	V.
	Amber coloured ampoules filled with hypochlorite solution (1 in 60) approx. and kept in the dark cool room.	Amber coloured ampoules filled with hypochlorite solution (1 in 60) and kept in the laboratory at room temperature. Sealed.	Amber coloured ampoules filled with (1 in 60) hypochlorite solution but mixed with N/10, NaOH in the ratio of 10 : 1 and kept in the laboratory room temperature. Sealed.	Colourless ampoules filled with hypochlorite solution (1 in 60) but mixed with N/10 alkali in the ratio of 9 : 1 and kept at laboratory temperature. Sealed.	Colourless ampoules filled with strong solution (1 in 44) and kept in the laboratory under ordinary temperature. Sealed.
27th March, 1925 ..	5 c.c. of hypochlorite solution = 23'73 N/10.	5 c.c. of hypochlorite solution = 23'73 N/10.	5 c.c. of the Mixture = 21'8 N/10	5 c.c. of the Mixture = 22'8 N/10.	5 c.c. of the Mixture = 31'8 N/10.
29th May, 1925 ..	Ditto = 23'73 ditto	Ditto = 20'37 ditto	Ditto = 18'4 ditto.	Ditto = 5'5 ditto.	Ditto = 6'3 ditto.
24th Aug s, 1925 ..	Ditto = 23'6 ditto	Ditto = 16'18 ditto.	Ditto = 15'2 ditto.	Ditto = 1'5 ditto.	Ditto = 0'5 ditto.
14th June, 1926	Ditto = 22'4 ditto.	Ditto = 10'78 ditto	Ditto = 11'4 ditto.	Nil	Trace.

Professor of Public Health Laboratory Practice,
School of Tropical Medicine.

THE VALUE OF INOCULATION IN THE PREVENTION OF CHOLERA.

By K. L. BASU MALLIK, M.B.,
Chachasi P. O., Howrah District.

DURING the last six years I have been using anti-cholera inoculation for the prevention of cholera among the European and certain classes of Indian employees of a jute mill near Calcutta. Cholera is endemic in this part of Bengal, and cases occur throughout the year, whilst from year to year in the months of April and November the disease becomes epidemic. The country is entirely riparian and the natural ground level low (18.3 in.). There is about 60 inches of rainfall during the year.

1922.

This being the first year of use of the vaccine, there was great reluctance on the part of the Indians of *bhadralog* class to take it. The vaccine was brought out from Manila by my then colleague, Dr. F. H. Colby, M.D., on his way out to India from the U. S. A. The inoculations given were as follows:—

Europeans; adult males ..	29
Adult females ..	6
Boy ..	1
Girls ..	2
Indians; adult males ..	12
TOTAL ..	50

came into contact with cholera cases in the hospital. The majority of the Europeans (20 out of 29) received two doses, whereas the majority of the Indians only took one dose. There was but little local reaction to the inoculation, with the exception of a slight degree of local inflammation which subsided in 24 hours.

Among these 50 inoculated persons there was no case of cholera during the year.

1923.

During this year there was widespread epidemic cholera among the cargo-boat crews, and hence a number of boatmen were inoculated. The figures for the year were as follows:—

Europeans; adult males ..	6
Females ..	1
Indians; boatmen ..	25
Menials ..	3
TOTAL ..	35

These cargo boats are used for bringing jute and supplies from Calcutta to the mills and factories along the Hooghly. The boatmen are sturdy upcountry Mahomedans, and the crew of a boat consists as a rule of 5 or 6 men, including a boy cook. They are a healthy type of men, with malaria and cholera as their chief complaints. When leaving Calcutta they take a caskful of drinking water from the city, and when the supply runs out in mid-river (as it very often does), they fall back on the river water, which is a frequent source of cholera.

During this outbreak several *manjhis* (boatmen) died of cholera, whilst others were attacked and recovered. Hence the inoculation of 25 of

them, comprising about half the total employed. Subsequently it was noticed that no case occurred among the inoculated *manjhis*, although other cases continued to occur among the non-inoculated crews.

1924.

During this year there was no epidemic cholera, and hence no inoculations were carried out. One case of cholera was admitted in November and proved fatal; this was in an uninoculated boatman.

1925.

The inoculations were as follows:—

Europeans; males	..	..	22
Females	..	..	8
TOTAL			30

(All with two doses).

Indians; clerical staff, one dose only ..	28
Two doses ..	20
Sweepers; one dose only ..	7
Boatmen (<i>manjhis</i>), one dose only ..	30
Steam launch staff, one dose only ..	11
Contacts living in the same room as a cholera case, one dose only ..	4
Durwans, one dose only ..	4
<hr/>	
TOTAL ..	
<hr/>	
GRAND TOTAL ..	134

This year the vaccine used was imported from the Central Research Institute, Kasauli, and some 58 per cent. of the Indian clerical establishment of *bhadralog* class refused to be inoculated on account of the reaction; whilst some 42 per cent. were inoculated. The boatmen and the staff of the Company's steam launch came forward readily and brought their friends; those who had been inoculated in previous years also coming forward. In fact they were positive enthusiasts for the "sui ka dawai" (hypodermic medicine); and the readiness with which such illiterate, but simple minded and sturdy folk will come forward for prophylactic inoculation when they have realised its benefits speaks well for the future of such inoculations in India.

Reactions in general were slight, and did not last for more than 48 hours. A curious point noticed was that reactions were much less among those Europeans who played tennis immediately after the injection than amongst those who did not. During this year (1925) there were 4 cases of (clinical) cholera and 3 of acute diarrhoea among the boatmen, but all in non-inoculated persons. A further point to be noted was the absence, not only of cholera, but even of diarrhoea and other bowel complaints among the inoculated. The total cholera incidence during

the year among the entire personnel employed was 2.31 per mille.

1926.

Only 5 Europeans and 4 Indians were inoculated during the year; total 9 persons. The incidence of cholera amongst the villagers this year was very low; and only 16 cases—or 2.43 per mille—occurred among the Company's employees. The incidence was again confined to the non-inoculated. The cases occurred among the non-inoculated crew of a boat. The 5 Europeans inoculated were newcomers to the Company's staff from Ireland and America.

1927.

During the summer epidemic of this year a large number of inoculations were carried out. The figures were as follows:—

Europeans; two doses each adult	..	33
Indians; one dose each.—		
Clerical establishment	..	50
Contacts and menials	..	82
Boatmen	..	27
		<hr/>
TOTAL	..	192

The vaccine was again obtained from Kasauli through the office of the Director of Public Health, Bengal. There was no case of cholera among the inoculated persons, but 8 cases occurred among the non-inoculated in September among about 150 boatmen.

A peculiarity noted during this year was a delayed secondary reaction at the site of inoculation. For the first 48 hours after inoculation there was some redness and tenderness at the site of inoculation. This then subsided completely; but 4 to 6 days later swelling and tenderness recurred at the site of inoculation with greater severity and lasted for from 24 to 72 hours. This was especially marked in the series of single dose inoculations.

SUMMARY.

In all 420 inoculations with anti-cholera vaccine were carried out during the six years concerned; those inoculated being the European staff, numerous contacts, attendants in hospital on actual cases of the disease, the clerical establishment, and the boatmen who are frequently compelled to drink sewage-polluted Hooghly water. The 420 inoculations were given and distributed among a total personnel and establishment of about 280 persons. Among these 280 persons there were 32 cases of cholera during the six years concerned; but in every instance the patient was a non-inoculated person. The following table gives a summary of the series.

There is every evidence to my mind of the high degree of efficiency afforded by inoculation with anti-cholera vaccine in the prophylaxis of cholera.

Summary of Cholera Inoculations.

Year.	Europeans.	Indians.			Total.	Incidence of clinical cholera in the inoculated.	
		Middle or Babu Class.	Menials and Labour Contacts.	Boat Crew.		Inoculated persons including boat crew.	Uninoculated boat crew only.
1922 ..	28	7	5	0	50	0	..
1923 ..	7	0	3	25	35	0	1
1924 ..	0	0	0	0	0	0	1
1925 ..	30	48	15	41	134	0	7
1926 ..	5	4	0	0	9	0	16
1927 ..	33	50	82	27	192	0	7
	113	109	105	93	420	0	32

A Mirror of Hospital Practice.

A CASE OF BALANTIDIAL DYSENTERY.

By BIJOY KRISHNA CHATTERJEE, M.B., D.T.M.,
(Bengal),

Assistant Surgeon, Assam-Bengal Railway Hospital,
Lumding, Assam.

L. M., a Hindu male, was admitted to the Assam-Bengal Railway Hospital, Lumding, for the treatment of chronic dysentery, from which he had suffered for the past fifteen years or so. His first attack had been about fifteen years previously; after that he had had three or four attacks at intervals of some three to four years. The previous attacks had not been prolonged, but the present one had persisted from February to November 1927, with remissions of only a few days at a time when he was free from symptoms. Each time he had been treated with injections of emetine.

He was very emaciated and weak, and slightly jaundiced in the eyes. On examination, the descending colon and sigmoid flexure were found to be palpable; the liver just palpable and tender; the spleen enlarged to about three finger-breadths below the costal margin, and tender. The stools as inspected macroscopically were semi-solid and dark coloured. No blood or mucus was noticed.

On microscopical examination of the stools the first day, nothing was found. On the second day, however, after a dose of magnesium sulphate, the stools were found to be full of motile *Balantidium coli*. (This finding was confirmed

by Dr. F. C. Lees, M.R.C.S., L.R.C.P., Medical Officer, A. B. Railway.)

After this finding the patient was put on to thymol, one 10-grain powder every hour, preceded and followed by 2 ozs. of magnesium sulphate, for one day. After this the stools were examined daily, and showed balantidia for five days. On the sixth day the thymol treatment was repeated. In the meantime, he was given daily an enema of 2 ozs. of 5 per cent. protargol lotion, and by the mouth a mixture containing iron and quinine citrate, nux vomica and liquor arsenicalis.

After the second thymol treatment the stools were examined on alternate days, and on two occasions *Balantidium coli* was found; the last time four days after the second course. After this the stools were examined daily for twenty days and no balantidia were found at any time. A protargol enema was given daily for ten days, and after that a simple enema of normal saline to counteract any possible cumulative effect of the protargol on the gut. A daily enema of quinine bihydrochloride, 1:1,000 was then given daily for eighteen days.

Finally, when his stools had become negative for *Balantidium*, the patient was put on a course of Yatren, one pill t.d.s., for seven days.

The patient gave a history of having taken meat in large quantities, but had never taken pig's flesh, and had had no association with either pigs or monkeys. He had eaten the flesh of porcupines frequently.

During his stay in hospital he suffered from severe colic on and off, and the only thing which gave him relief from this was small doses of tincture of *cannabis indica*. (It was found out that he was a *ganja* smoker.) His appetite was poor at first, but later on improved much, as also did his general health. There was no pyrexia during his stay in hospital.

He was discharged (?) cured on the 36th day after his admission.

Remarks.—The case is of interest from several points of view.

(1) *Balantidium coli* infection is very rare in India; so much so that Byam and Archibald do not mention its occurrence in India, though Major Knowles mentions its occasional occurrence in this country, and especially in Assam.

(2) The patient had not been associated in any way with pigs or monkeys—the natural hosts of *Balantidium coli*.

(3) The patient's frequent meals of porcupine flesh. Is the porcupine still another host of *Balantidium coli*?

(4) The apparent cure by thymol and protargol treatment. *Balantidium* infections are notoriously difficult to eradicate.

(5) The severe abdominal colic, perhaps due to his not having access to *ganja*, and cured by a few small doses of *cannabis indica*.

My thanks are due to Dr. F. C. Lees, my medical officer, for kindly permitting me to send a report on this case for publication.

A CASE OF CEREBRO-SPINAL MENINGITIS WITH RECOVERY.

By K. M. BASU, M.B.,

LATE CAPT., I.M.S.,

Assistant Surgeon, Uluberia Hospital, Howrah District.

On the 29th August, 1926, I was called in to see a patient, N. K. Ray, a Hindu male, aged 25 years suffering from continuous fever with intense headache of five days duration. The patient had had no sleep for four nights owing to the headache, whilst the temperature had ranged from 100 to 101°F.

Some years previously the patient had had syphilis, for which he was treated with injections of some preparation of arsenic. He had also had pneumonia with pleurisy some two years previously, and had had an attack of herpes on the chest fifteen days prior to onset of his present illness. He takes alcohol and country liquors

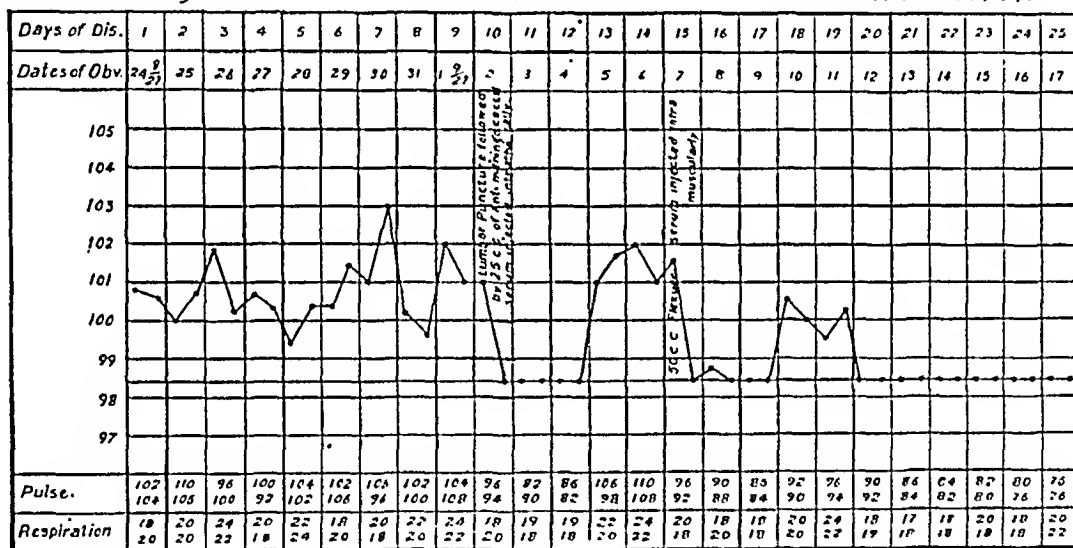
perchloride mixture prescribed. Hexamine, 10 grains, was given twice daily, and chloretone, 10 grains, prescribed for sleep at night. Blood films were sent to the Calcutta Clinical Research Association; the report was that no malaria parasites were found, and that the differential leucocyte count showed polymorphonuclears 77 per cent., small mononuclears 17 per cent., and large hyaline mononuclears only 6 per cent.

30th August.—Headache much less, but temperature went up to 103°F.

31st August.—Headache has practically disappeared. The relief with continuous potassium iodide treatment appears to indicate a syphilitic origin to the infection. Potassium iodide and urotropine continued.

1st September.—There was a sudden and severe return of the headache, with neck retraction, semi-delirium, and fever, 102°F. The patient was restless throughout the day. Lumbar puncture was now decided on, but it was decided

Name... N. K. Roy. Cast... Bengalee. Age... 27 years. Disease... Cerebro-Spinal Meningitis.
Attack... 24th August 1927. Result... Cured. Date of Result... 12. 9. 27.



in fair amount, and has had malaria off and on. The fever had commenced with rigor and pains all over the body on the 25th, with onset of the severe headache on the evening of the 26th, whilst stiffness of the neck had appeared on the 29th—the day of my first visit to him.

On physical examination, the neck was found very stiff and painful on movement; the pupils widely dilated; and photophobia present, with great sensitiveness to noises. Kernig's sign was positive, but Babinski's sign negative. The knee jerks were exaggerated and no skin rash visible. The liver was enlarged to three finger-breadths below the costal margin, and the spleen was not palpable. The lungs and heart appeared to be normal. The bowels had been constipated from the beginning of the illness.

A provisional diagnosis of meningitis (? syphilitic) was made, and calomel in divided doses, together with a potassium iodide and hydrarg.

to await the arrival of anti-meningococcus serum before carrying it out. Chloral, bromides, and chloretone were given.

2nd September.—Condition no better; if anything, worse. Lumbar puncture was carried out, and the fluid withdrawn came out with great force and proved to be turbid; some 25 c.c. of fluid was withdrawn, the fluid spurting out as if an artery had been cut. An equal amount of anti-meningococcus serum was injected inside the theca. The cerebro-spinal fluid removed was sent to the Clinical Research Association in Calcutta for examination. Their report, received two days later, was that it was faintly turbid; contained no glucose; gave a negative globulin test; showed 1,000 leucocytes per c. mm.; with a content of 94 per cent. polymorphonuclear leucocytes, and 6 per cent. small mononuclears. Gram-negative, intracellular diplococci were present in the stained smear. Culture had yielded

sterile results. Later on, a growth of meningo-cocci was obtained.

On the evening of the 2nd, within six hours of the lumbar puncture, the temperature dropped to normal for the first time, with simultaneous disappearance of the headache and neck rigidity. For the next two days the patient's condition rapidly improved.

5th September.—The patient's temperature oscillated between 100 and 102°F., but with no return of the headache or stiffness of the neck.

7th September.—The temperature was still elevated to over 101°F., and a second dose of 50 c.c. of anti-meningococcus serum was given intramuscularly. Within six hours the temperature dropped to normal, and continued so with the exception of a rise on the 10th and 11th September.

Quinine was now administered, and the patient's history thereafter was uneventful; recovery being complete.

Remarks.

(1) There was no record of any recent cases of cerebro-spinal fever in the locality, whilst the patient had not left his home for a long time previously. Further, the previous history of syphilis strongly suggested a syphilitic infection of the spinal cord.

(2) On the other hand, the signs and symptoms presented were typical of cerebro-spinal fever; e.g., fever, severe headache, stiffness of the neck, and a positive Kernig's sign. In all such cases where diagnosis is obscure a lumbar puncture should be carried out. In the present case this was done with the ordinary long stout needle included in my pocket surgical aid case, intended for subcutaneous administration of normal saline.

(3) The terminal rise of temperature and the final influence of quinine in restoring a permanently normal temperature leads one to suspect that latent malaria may have had an element in the case.

A CASE OF LYMPHATIC LEUKÆMIA.

By J. M. GHOSH, M.B. (Cal.), D.P.H. (Lond.),
D.T.M. & H. (Cantab.),

Chief Medical Officer, Keonjhar State, Sadar Hospital,
Keonjhar, Balasore.

MANGAIKOL, aged 25, single, Hindu male cultivator, was admitted to hospital for severe abdominal colic on the 29th August, 1927.

The hospital records showed that he had been an in-patient in the same hospital seven months previously for the same complaint, and had been discharged cured (?) after a fortnight. He gave a history that the colic had lasted on and off for about a year, lasting each time for a variable period, having no relationship to food, and being localised around the umbilicus. It had never been very acute.

On examination, the patient proved to be of poor physique, with a rather dull intelligence. His abdomen was covered with scars,—the result of application of counter-irritants. He was definitely anæmic. The family history elicited nothing of importance, and he denied all history of previous dysentery, diarrhoea, fever, or hæmorrhage from the intestine or elsewhere; in fact he stated that he had been generally healthy.

Physical examination failed to detect any enlargement of the spleen or liver; the lungs and heart appeared to be healthy; the pulse was soft and quick, however. The stool emulsion—examined in direct smear without concentration—showed *Ankylostoma* ova present. The urine was alkaline, free from albumin and sugar, and showed a deposit of amorphous and triple phosphates.

Blood examination, however, gave the following quite unexpected picture:—

Red blood corpuscles 2,050,000 per c.mm.

Total leucocytes 75,000 per c.mm.

Polymorphonuclears 4 per cent.

Lymphocytes (of chronic type) 96 per cent., whilst a few Rieder's cells were present, and megaloblasts. No malaria parasites were encountered.

On re-examination of the patient clinically, the inguinal and femoral glands on both sides were found to be fairly discrete and tolerably hard, but individually no bigger than the nose of a service revolver bullet. The area over the sternum was resonant throughout, and no other glands were palpable in any region of the body.

The patient remained in hospital for only a week,—the sight of a patient being brought into the ward from the operation theatre on a stretcher scaring him away. Although he gave no history of fever prior to his admission to hospital, his temperature in the evenings when in hospital ranged from 99 to 101.6°F., and in the mornings from normal to 99°F.

In this case there were practically no signs or symptoms. The mild abdominal colic might possibly have been due to the hookworm infection. But for the microscopic diagnosis the patient might have been submitted to treatment with all the gastro-intestinal sedatives in the Pharmacopœia.

A CASE OF IMPERFORATE ANUS.

By INDRA MAN.

Assistant Surgeon, Chancha Hospital, Bhadgaon, Nepal.

A. K., a male infant, three days old, was brought to this hospital with the complaint that there had been no motion since birth.

On examination a pin-track was found leading towards the rectum, but there was no communication of the gut with the exterior. Also there was no bulging of the perineum when the infant

cried. The abdomen was somewhat distended, but the child was obviously not in distress, and no distension or other abnormality could be detected on abdominal palpation.

Operation.—As I was afraid of toxic infection in such a tiny baby, no anæsthetic was given. An incision, some $1\frac{3}{4}$ inches in length was made from the pin-track anteriorly, and enlarged posteriorly. After dissection to a depth of some $2\frac{1}{2}$ inches the gut was recognised by its white appearance. It was free on its posterior aspect, but attached anteriorly. The adhesions were snipped through and the gut brought down to the aperture of the wound. A puncture having been made into it, black tarry liquid was evacuated. It was then stitched to the parietes, and a continuous silk suture applied. A drainage tube was inserted for the fæces to escape, and the whole wound packed with antiseptic dressings in the hope of keeping the parts clean.

Post-operative Treatment.—As the infant's mother refused to stay in hospital, it was advised that the child should be brought to hospital twice a day for changing the dressings. By the second day the sphincter had assumed its function, as shown by its red and rugose appearance. The wound became infected in its posterior part despite all antiseptic precautions, but healed by granulation by the twenty-first day. There were no complications, and the infant made a splendid recovery, with a functional anus.

Remarks.—I have previously had cases of imperforate anus in infants here occasionally, but they did not usually survive for more than three or four days. My own impression is that cases, such as the above, can only be saved by immediate operation. The parents deny all history of venereal disease, and one would like to know the causes of such congenital malformations.

The baby is now three months old, and is apparently perfectly healthy.

A CASE OF CHRONIC AMŒBIC INFECTION, ESPECIALLY AFFECTING THE VERMIFORM APPENDIX.

By J. BA CHOW, I.M.P.,

Sub-assistant Surgeon, Civil Hospital, Syriam, Burma

CHILAM, Mohammedan male, age 26 years, coolie, a resident of Durga Ward, Syriam, was admitted into this hospital on the 16th July, 1927, for the treatment of emaciation, œdema of the feet and frequent loose watery motions.

Ten months previously he had suffered from dysentery for about a month, and since then he had had recurring attacks of diarrhœa in spite of treatment. Various forms of medical treatment were tried one after another for over six weeks without improving the patient's condition. It was then decided to lavage the large bowel through a cæcostomy opening, and the operation

was done on the 2nd September, 1927, under spinal anæsthesia. As the appendix was found thicker than normal, of a very firm consistence, and slightly adherent, with a concretion at the tip, it was removed during the operation.

On opening the lumen of the appendix, a small collection of fæces was found at the tip, with muco-pus in the rest of the lumen. A smear of the latter was examined under the microscope and showed numbers of active *Entamœba histolytica*.

The interesting point in this case is that no amœbæ were found in repeated examination of the stools, while the appendix literally swarmed with them. This probably accounted for the resistance of the patient to treatment. He now has regular formed stools and can take full diet without any inconvenience.

I am indebted to Dr. W. B. Crawford, Superintendent of the Civil Hospital, Syriam, for permission to publish this case.

APOMORPHINE HYDROCHLORIDE IN THE TREATMENT OF PERSISTENT HICCUGH.

By R. C. PANDA, I.M.P.,

Parikud, Puri District.

APOMORPHINE hydrochloride is said to be the most powerful emetic in the British Pharmacopœia, and as such it is extensively used in cases of poisoning. As an expectorant also it is prescribed in cases of chronic bronchitis. I have never however seen it used for other conditions. Professors Savill and Osler advocate the use of the drug (in doses of $1/10$ th to $1/8$ of a grain) in cases of hiccough, but they do not explain how the drug acts in checking that distressing symptom.

Two and a half years ago I had to treat a very severe case of persistent hiccough, while at Parlakimedi, Ganjam District. I tried almost everything that I could think of, until—finally—a single injection of apomorphine completely cured the patient of his very distressing symptoms. Curiously enough, the patient did not vomit, and the drug appeared to have effected a complete cure.

Since then I have relied on this drug for the treatment of persistent hiccough. Only a few days ago I had such a case, and gave two injections, one each on alternate days. The patient had slight vomiting after both injections, but I was careful to give the drug on an empty stomach, so that he vomited only bile and gastric juice.

I would be much obliged if any of your readers can kindly enlighten me on the action of the drug in these cases of persistent hiccough, and why little or no vomiting occurs, when the drug is administered in such cases.

Indian Medical Gazette.

FEBRUARY.

"DIATHESIS."

THE "blessed word diathesis" used to be in constant employment by medical men, its use gave us a comfortable feeling of erudition and covered a great mass of ignorance. Nobody dared to question the existence of a condition which had been accepted by generations of medical men, and it was nothing short of rank heresy to raise doubts as to the importance of the influence exerted by diathesis. At a later date it became the fashion to demand evidence before any dogma was accepted, and when most of the diseases which had been regarded as diathetic were found to be due to bacteria or faulty diet the term diathesis with all its implications was almost abandoned.

The pendulum is now swinging back and an authority like Sir Archibald Garrod calls attention to the importance of diathesis: he points to the renewed attention which is being paid to the subject, especially in Germany, and asks for renewed study of its influence in the causation of disease. Sir Archibald does not clearly define the word diathesis, but he excludes acquired tendencies to disease, and limits the use of the term to inherited bodily conditions which predispose to some diseases. He says that it is indisputable that some individuals, families and races are far more liable than others to particular diseases and regards this basal fact as the foundation on which the various doctrines of diathesis are built. Basal facts are simple and solid in themselves but they are capable of sustaining a variety of less substantial superstructures in the form of explanations, and it is by no means safe to assume that a basal fact like the frequency of diabetes or gout in some families or races is capable of only one interpretation. It is a basal fact that tuberculosis is especially common in some families, yet the tuberculous diathesis is no longer a self-evident proposition; its very existence is difficult to prove, now that so much is known of the part played by environmental factors in the causation of the disease. It is a basal fact that diabetes is very common in some families in Bengal, but it is not right to assume that the true explanation of the fact lies in an inherited diathesis. Two important considerations have to be taken into account: one is that the families concerned have adopted habits of diet and exercise which differ from those prevailing among the families which are free from diabetes, and the other is that families which have sprung from the same stock as the diabetic families but live under different environmental conditions are not specially prone to the disease.

It is a basal fact that cancer of the penis is far commoner among Hindus than Mahomedans,

but the environmental factor of circumcision is far more likely to explain the immunity of Mahomedans than an inherited diathesis.

Sir Archibald points to the gouty diathesis as one of the great examples of an inherited tendency to disease. He writes "in gout we are confronted with a highly hereditary malady presumably based on an inborn defect." But we are told by others that gout is a "disappearing disease" and that the offspring of gouty parents seldom suffer nowadays from gout. In this case also is it not possible that the well known tendency of some families to adopt faulty methods of eating, drinking and exercise may be the true explanation? In this connection it is necessary to indicate a common fallacy which is that environment first comes into play at birth; we are prone to forget that a most important period of life is spent in the mother's womb and that nourishment during this period consists of materials derived from the mother's blood, so that even if we were to find that the infants of gouty mothers showed differences in blood composition from those of other mothers we should not be justified in attributing the difference to inherited characteristics.

Environmental factors are complicated and elusive; they may begin to act several months before birth, and it is only when they can be satisfactorily excluded that we are justified in asserting that heredity is the chief factor concerned in the causation of any disease.

If inherited malformations and some diseases like Friedrick's ataxy were included as diathetic diseases it would be possible to prepare a long list of diatheses, but if we simply regard these as inherited diseases the proven cases of diathesis become very few.

It is natural and easy to believe that inherited tendencies to many diseases do exist in families or races but the stock examples like the tendency of Jews to diabetes, of negroes to tuberculosis, and of indigenous populations to yellow fever are capable of explanation on environmental grounds. It is not asserted that inherited diathesis is non-existent, it probably does exist and it may prove to be a very important factor in the causation of disease. On the other hand it is unquestionably a wise policy to make an exhaustive search for environmental faults which can be remedied before we fall back on the paralysing and fatalistic view that the diathesis is to blame.

With regard to racial susceptibility to disease, it is important to note that most of the diseases which are known to be inherited have a world-wide distribution, so that inborn structural defects appear to be cosmopolitan. In the same way special susceptibilities to diseases, vaccines and drugs are also found in some individuals among all races, they have rarely been shown to occur in one race and to be absent in others. Such isolated examples as the great mortality from measles in newly affected populations are

unexplained, but they are possibly due to a complete absence of acquired immunity in the populations concerned, in other words to the lack of an environmental factor which protects the other peoples of the world.

There is no satisfactory explanation of the remarkable changes which have taken place in the virulence of small-pox and scarlatina in European countries within the past few years, but we do not assume that the changes are due to the elimination of a special diathesis.

The truth is that our powers of observation are defective, and it is better for us to admit the fact rather than to adopt plausible explanations or to take refuge in pseudo-scientific words like "diathesis," "functional," "idiopathic," and the like. In such words there lurks a potent suggestion, viz., that we understand the condition to which the high-sounding name has been applied, whereas our real condition is one of mental fog.

Taking these considerations into account, it is perhaps better that the word diathesis should remain enshrined as a relic of the days when accurate observation was at a discount and dogma swayed the minds of men. The term "inherited tendency to a disease" will serve very well to express the idea which underlies the word "diathesis" and will be less likely to cause misleading suggestions. To sum up the whole matter, our efforts should be directed chiefly towards the discovery and removal of errors of environment; when these have been exhaustively dealt with we may fold our hands and admit that heredity is responsible for the rest.

CALCUTTA STUDENTS' HEALTH.

THE report on the Students' Welfare Scheme of the University of Calcutta for 1926 is an interesting document. Its special value is that it supplies detailed information of the health and physical standards of large numbers of students in Calcutta and its suburbs.

The most disquieting feature is that there is some evidence of an increase in the "general defects" and in the standards of physical development. Two out of every three students show some defect, and it is obvious that the health of the Bengali young men calls for careful investigation.

A few of the outstanding points brought out in the report are noteworthy.

About 44 per cent. of the students show a "stooping" gait and the percentage is greater among the younger students.

The rate of growth in height between the ages 16—18 is four times greater than between 18—21, while the rate of increase of weight is three times as great between the ages of 18—21 as in the age group 16—18.

A diet table drawn up by Rai Bahadur Dr. Chuni Lal Bose is of interest; this consists of rice 6 oz., wheat flour (*Ata*) 10 oz., pulses (*Dal*) 3 oz., fish 5 oz., potatoes 6 oz., other vegetables 8 oz., ghee $\frac{1}{2}$ oz., mustard oil 1 oz.,

sugar 1 oz., salt 1 oz. This represents about 90 grammes proteins, 70 grammes fats, 468 grammes carbohydrates, and 2,800 calories. This diet differs from the usual Bengali scale in containing more wheat flour than usual, and a recommendation is made that 4 oz. fresh milk curds should be supplied to those who object to fish. The cost of the diet is about $8\frac{1}{2}$ annas at prevailing market rates. Fresh fruit is recommended when in season.

It is certain that pure fresh milk would be a valuable addition to this diet if it can be supplied within the available budget, and that fresh fruits should form a normal item of the diet, otherwise the diet scale appears to be quite satisfactory. It is likely that most students will buy extras when they can afford to do so.

The students fall within the following age groups. 16-17, 816; 17-18, 2,155; 18-19, 2,542; 19-20, 2,589; 20-21, 1,929; 21-22, 1,153 and 22-23, 788. Over 23 there are about 600.

The caste distribution shows 31 per cent. Brahmmins, 28 per cent. Kayasthas, 7.68 per cent. Mahommedans, nearly 2 per cent. Christians, and the rest belong to "other castes." About 30 per cent. of the students are returned as "thin," about 15 per cent. as "muscular" or "stout," the rest being returned as "medium."

The "thin" students are 34.4 per cent. in the 16-17 age group and 19.5 per cent. in the 21-22 age group, while the muscular and stout increase from $7\frac{1}{2}$ per cent. in the 16-17 group to $16\frac{1}{2}$ per cent. in the 21-22 age group, so that there is a tendency to put on flesh in spite of the adverse conditions of life. The students are classified according to complexion: the Brahmin students are rather fairer than those of other castes, but the differences are not striking, except that the Kshatriyas have a larger proportion of very fair students and a smaller proportion of very dark ones than any of the other groups.

The average heights and weights for the various age groups are:—

	15-16	16-17	17-18	18-19
Height ..	163.45 mm.	164.19	165.42	165.99
Weight ..	47.07 kilo	48.28	49.34	49.60
	19-20	20-21	21-22	22-23
Height ..	166.18	166.41	166.55	166.18
Weight ..	50.95	52.02	52.42	52.92

The average chest measurements on inspiration range from 80.38 cm. in the 16-17 age group to 84.36 cm. in the 22-23 age group. Chest expansion in cm. averages 4.01 and 0.587 in the same groups. The vital capacity in litres is 2.55 and 2.95 in these groups. It is surprising to learn that the acuteness of hearing, which was represented by the figures 54.7 and 57.8 for the right and left ears respectively in 1921, has risen to 72.83 and 79.09 in 1926. The conditions under which the tests were carried out are stated to have been unsatisfactory but the observers are convinced that the left ears are more acute than the right and also that the acuteness of hearing falls off from the age of 15 till 24, the figures

for various ages (right ear) being 15-16, 84.2; 18-19, 73.41; 23-24, 65.28.

The variations in the strength of grip are interesting; at the age of 15-16 the grip of the right hand in kilos is 32.11; it rises steadily till the age of 21-22 is reached when it is 40.83; then it falls and in the 25-26 group it is 39.02.

About one-third of the students show defects of refraction and no less than three-fourths of the defectives fall within the category of ± 5.2 to ± 5.0 diopters. Only $17\frac{1}{2}$ per cent. of those who need glasses are provided with suitable glasses and $62\frac{1}{2}$ per cent. have none at all. Here is a defect which could easily be remedied.

Dental caries occurs in about 8 per cent.; as many as 19 per cent. have bleeding and spongy gums, but only 4.5 per cent. have pyorrhoea. Presumably the bleeding and spongy gums are the precursors of the pyorrhoea which is almost universal in later life. It would be interesting to classify the state of the gums according to age. The teeth are said to be defective in some way in about 33 per cent. of cases.

About 27.5 per cent. of the students have some form of skin disease, especially ringworm, pityriasis versicolor and acne. Three cases of leprosy were detected among 12,705 students. This is an exceedingly small number, but it is likely that any student whose disease is conspicuous would already have been excluded, and it is also likely that early manifestations of the disease would not be detected during a hurried examination.

Among general defects we find that 4.6 per cent. suffered from heart defects, 0.47 from lung disease, 0.66 from liver defect, about 2 per cent. had enlarged spleen, 12.31 per cent. had diseased tonsils, nearly 1 per cent. had hydrocele, over 1 per cent. had "orchitis." Other points of interest will be found in the report which is issued by the Calcutta University Press.

This shows clearly that the students are defective before they come to the colleges, the life at the colleges does not appear to accentuate the damage which has been done but rather the reverse. It is obvious that the physical condition of the Bengali school-boy needs to be seriously investigated with a view to devising means of giving him a better start in life. The conditions under which college students live are perhaps not so bad as those of the school-boys, but they call for great improvement and the report of the Students' Welfare Committee will serve a useful purpose if it awakens the conscience of the Calcutta University and the general public to the urgent need for a health campaign among school children and students.

Calcutta Branch of the B. M. A.

It is proposed to form a Calcutta Branch of the British Medical Association. The territory included under the branch will be that known as the Presidency Division and the part of the Burdwan Division which is south of the Ganges. Will any medical men who are interested kindly communicate with Lieut.-Col. R. Knowles, Calcutta School of Tropical Medicine, Central Avenue, Calcutta?

SPECIAL ARTICLES.

THE USE OF SANOCRY SIN IN PULMONARY TUBERCULOSIS.

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ATTEMPTS have been made for some time past in the field of chemotherapy with a view to find a remedy for tuberculosis. Various compounds of copper, gold, manganese, glucinum and other metals and various derivatives of chaulmoogra oil and cod-liver oil have been tested. Nothing definite or convincing was brought to light, however, until about two years ago, bright and hopeful news came from Denmark and it was at once received with keen sympathy all the world over.

Sodium-thiosulphate of gold has been introduced in the treatment of phthisis by Professor Moellgaard of Copenhagen. Sanoerysin is the name given to this compound by him. It is an inorganic gold compound containing the negatively charged ion AuS_2O_3 to which its therapeutic properties are said to be due. It is a snow-white crystalline substance consisting of long, silky, glistening needles. It is a stable compound and remains unchanged when kept dry in sealed ampoules for at least one year. It is readily soluble in water.

Moellgaard believed that sanoerysin was a chemotherapeutic remedy that brings about destruction of tubercle bacilli, and in doing so, it liberated a certain amount of toxic substances. Recent investigations have shown definitely that the action of sanoerysin is due not to the destruction of the bacilli but to its action on the tuberculous tissue itself. This assumption is supported by the fact that the direct bactericidal influence of sanoerysin on tubercle bacilli *in vitro* is very insignificant. It has been suggested that sanoerysin brings about the decomposition and destruction of exudative tissue as a result of which certain protein-containing substances are produced which circulate in the blood and stimulate the various defensive forces of the body. This leads to increased phagocytosis and formation of anti-tuberculous products which ultimately bring about increased fibrotic growth round the foci of the disease. The curative effects of sanoerysin, therefore, appear to be due to the anti-tuberculous substances which it produces by its action on the tuberculous lesions. Of the initial theoretical foundation of Moellgaard, therefore, hardly anything remains to-day.

It is now recognised that sanoerysin has a metallic action and can act as a metallic poison by virtue of its gold content. It has a tendency to cumulative effects if given in large doses or at frequent intervals, or to persons who are unable to excrete it properly.

After administration sanoerysin diffuses quickly into the tissues. Only about 50 per cent. of gold is eliminated through the kidneys and intestines, chiefly the former. The remainder is retained in the tissues for a long time, especially in the liver and muscles. Elimination by the kidneys begins early and goes on for several weeks, so that a definite amount of gold is present in the circulating blood for two weeks at least. The largest amount is present in the first week and if the drug is administered before the week is over, cumulative effects are likely to appear. Sanoerysin, therefore, behaves in the body in the same way as other heavy metals.

Selection of Cases.—The acute pneumonic type of pulmonary tuberculosis is said to be best suited for sanoerysin treatment, especially in its early stages. In chronic tuberculosis of the lungs the following factors must be considered:—

- (1) The extent and accessibility of diseased foci.
- (2) The degree of resistance possessed by the patient.
- (3) The state of efficiency of the eliminative mechanisms of the body.

Good results are obtained in exudative (caseous) cases of not more than twelve months' duration. In productive (fibrotic) type of cases of long standing, with few or no blood vessels, it is obvious that the drug cannot penetrate through; hence these cases are not suitable for sanocrysin treatment.

Speaking in general terms, the advanced and toxic type of patient is unsuitable for sanocrysin treatment; while a relatively recent case, still well nourished and with some degree of control of his temperature, is likely to do well. A strong heart and not too well-marked toxic symptoms are essential for treatment. The drug is also said to be indicated in cases of hæmoptysis in order to prevent the tubercle bacilli from spreading throughout the lungs.

Contra-indications.—It should be kept in mind that the treatment engages the power of resistance to a certain degree. Anything that affects the resistance of the patient should, therefore, be considered as a contra-indication. The following are the contra-indications for the use of sanocrysin:—

- (1) Slight and early limited lesions which can be cured by conservative methods.
- (2) Chronic fibroid lesions.
- (3) High fever.
- (4) Extensive disease of long duration.
- (5) Renal and intestinal tuberculosis.
- (6) Tubercular meningitis.
- (7) Pre-existing tubercular disease of other organs, healed or active, e.g., surgical tuberculosis combined with fistulas and abscesses.
- (8) Highly intoxicated cases having no power of resistance, as indicated by failure to gain weight when at rest, irregular temperature, high sedimentation rate, etc.
- (9) Organic diseases of organs like the liver, spleen, kidneys or lowering of functional efficiency of the liver or kidney.

Dosage.—Moellgaard, believing in the chemotherapeutic action of sanocrysin, advocated large doses of 0.5 to 1.5 grammes at frequent intervals. The severe toxæmia and the "tuberculin shock" which resulted from this method of administration could not in all cases be relieved or prevented by the administration of the antitoxic serum. Moreover the serum made things worse by producing serum-sickness in addition to the already existing depressed condition of the patient. The dangerous consequences of this method of administration have, therefore, resulted in the modification of dosage. The present tendency is (1) to begin with small doses, (2) to administer the drug at long intervals, and (3) to avoid the use of the serum, which in itself is very trying to the patient and quite unnecessary if the shock can be avoided.

The modern dosage, as generally used in the West, is from 0.1 to 0.25 grammes increasing up to 1.0 gramme with intervals of about seven days between the injections. The maximum dose is repeated until the desired effect is produced. This finishes a course. If a second course is necessary, it is usually given after an interval of not less than two months.

In severe and pyrexial cases and also in women it is safer to begin with smaller doses and allow longer intervals. The golden rule to remember is not to give the next injection before the reaction from the previous one has passed off.

Some physicians give a hypodermic injection of caffeine after every dose of sanocrysin, apparently to counteract the depressing action of sanocrysin on heart.

In India, owing to the weaker constitution of Indian patients as a rule, it is better to start with smaller doses and give sufficient intervals between them. The initial course of injections should be somewhat as follows:—0.1, 0.2, 0.35, 0.5, 0.65, 0.75, and 1.0 gramme. The last dose is seldom reached in Indian patients. The maximum, or to be more precise, the optimum dose for a patient should be repeated until the desired effect is produced. In febrile and weak patients it

may be necessary to begin with 0.05 gramme. Some physicians repeat the first (initial) dose until the patient is able to tolerate it. Larger doses are then given until the optimum is reached.

The doses mentioned above are by no means the absolute rule. Variations may be made in them according to the needs of the particular case. For the subsequent courses it is not necessary to begin with small doses like the initial course. The subsequent courses may be arranged somewhat like this:—0.25, 0.5, 0.75, and 1.0 gramme.

It may be mentioned here that sanocrysin is supplied in ampoules containing respectively 0.1, 0.25, 0.5, and 1.0 gramme. It is not difficult, therefore, to make the required doses by various combinations of these quantities.

Mode of administration.—The clinical administration of sanocrysin is best performed by intravenous injection. A solution in distilled water of about 5.0 per cent. is almost isotonic with blood and should be used for intravenous injection. When the veins are not accessible for intravenous injection, e.g., in some women and children intramuscular injections are advised. In such cases a 3.0 per cent. solution of the drug is advised in order to avoid symptoms of irritation. Subcutaneous injection is not advisable owing to the risk of skin necrosis. Accidental perivascular injection causes a little swelling and soreness at the site of injection but necrosis does not occur if aseptic precautions have been observed. Care should be taken about the distilled water just as with salvarsan.

As mentioned above a 5.0 per cent. solution is isotonic with blood. Therefore it will be noticed that for purposes of intravenous injection 2.0 c.c. of distilled water are required for every 0.1 gramme of sanocrysin.

An all-glass syringe with side nozzle of 20 c.c. capacity should be used, so that a full dose of 1.0 gramme can also be given with it. A platinum needle should be employed. An ordinary steel needle is acted upon by the drug and is, therefore, not safe. For the same reason a "Record" syringe is not advisable. The syringe and needle should be thoroughly sterilized in boiling water.

Distilled water should be used for making the solution and it should be boiled again at the time of making the solution. In short, the same precautions should be taken about the use of water as in the case of salvarsan.

The required quantity of water should be drawn into the syringe. The top of the ampoule should then be filed off and the solution made in the ampoule itself. The solution is then drawn direct into the syringe. The injection should be given as soon as possible after it is ready. The veins at the bend of the elbow are best suited for injection. The skin may be sterilised by rubbing ether on it, but if tincture of iodine is used it should be wiped off, when dry, by rectified spirit so that the vein may become visible. The needle should be passed through a flame just before it is inserted into the vein in order to be sure of sterilisation. When the needle is in the vein (as will be known by the presence of blood in the syringe) the solution should be slowly and steadily pressed into it.

In some patients, especially females, it is found difficult sometimes to get the vein. In such cases it has been found that the operation is much facilitated by "feeling" for the vein with sterilized fingers. It is far easier to feel the course of the vein than to see it. I have never found any difficulty by this method.

The injection should preferably be given in the morning, and the patient undergoing the treatment should preferably be kept in bed as long as the treatment lasts.

During the course of treatment it is necessary to examine the urine at least twice daily—morning and evening—for albumen and casts. It is also necessary to record the temperature three or four times daily. Other symptoms should also be looked for, e.g., metallic taste in the mouth, ulcers in the mouth and on the tongue, etc. It is for the doctor to look for these

signs and symptoms and not wait for the patient to exhibit them. They may necessitate the interruption of treatment for the time being at least.

As mentioned above, with the cautious use of sanocrysin, the administration of antitoxie serum has been rendered unnecessary. If, however, at any time symptoms of toxin or tuberculin shock appear, the antitoxie serum may be used. The clinical administration of the serum is most easily done intramuscularly, but in case of urgency it should be given intravenously. The time of absorption by intramuscular injection is between 16 to 24 hours. When intravenous injection has to be given, desensitisation should always be carried out immediately before the injection to avoid anaphylaxis. This is easily done by giving 0.5 c.c. of the serum intravenously, then waiting for a minute or so, and then slowly injecting the rest of the serum.

In cases where a fresh serum injection has to be given after a week from the previous one, desensitisation must always be done by intramuscular injection of 2.0 c.c. of the serum a day before.

Reactions and Complications.—These are very common in the treatment of sanocrysin. They are as follows:—

(1) Temperature reactions:—These may occur in three ways:—

- (a) Short, immediate:—3 to 10 hours after the injection as a sudden rise followed within a short time by a fall.
- (b) Prolonged:—a gradual rise during the day of the injection, followed by a gradual fall.
- (c) Delayed:—rise occurs after the second day or so and remains continuous for days.

The temperature reactions are as a rule accompanied with headache and pain in the limbs and joints.

(2) Gastro-intestinal disturbances, e.g., nausea, vomiting, diarrhoea, anorexia, and hiccough.

(3) Loss of weight.

(4) Albuminuria and cylindruria:—Occur in two forms:—

- (a) Early:—occurring in connection with other reactions and shortly after the injections. As a rule disappears soon and spontaneously.
- (b) Late and independent:—occurring later on in treatment. Is due either to too rapid increase in doses or to too short intervals between the injections. Lasts for a long time.

(5) Ulceration of the mouth and tongue.

(6) Skin reactions:—Varying from ordinary skin rashes to actual dermatitis of exfoliative type.

(7) Focal reactions:—Temporary increase in expectoration and transient increase in râles.

(8) Toxin or tuberculin shock:—Rarely seen with the present modification in doses. Shown by a fall in temperature, cardiac asthenia, and albuminuria.

(9) Jaundice.

(10) Hæmoptysis.

No fresh injection should be given until all the reactions from the previous dose have passed off. Some of them may necessitate interruption of the treatment temporarily.

Danger Signals.—Not only is it necessary to look for albumin in the urine but the quantity of urine excreted during 24 hours should also be noted. Marked diminution in the daily excretion of urine should be regarded as a danger signal. So also the occurrence of small apthous ulcers on the tongue and buccal mucous membrane. The mouth should be examined for a few days after every injection. Gastro-intestinal disturbances and a metallic taste in the mouth are also danger signals which must be kept in mind. These danger signals necessitate caution in the administration of the drug.

Conclusion.—The favourable effects of sanocrysin are found in the remarkable improvement that it sometimes causes in the physical signs. This change in tissues of the chest can be corroborated by skiagrams

taken before and after a course of sanocrysin. If possible, therefore, x-rays should be employed during the course of treatment. Sanocrysin also reduces the number of tubercle bacilli in the sputum. The sputum is also reduced in quantity. Many patients declare that they feel stronger in spite of loss of weight. Last but not least, it has a great psychical effect on the patient who thinks that something serious is being done for him.

From what has been said above it will be noticed that sanocrysin, like tuberculin, is a double-edged weapon which may cause more harm than good if not properly used. The treatment necessitates the daily examination of the urine, frequent taking of the temperature—in short, the close observation of the patient by the doctor. Sanocrysin is, therefore, a drug that is best suited for use in an institution where a well-trained staff is always available to meet the emergencies of the treatment. The patient must be intelligent and able to understand that he may have severe reactions and lose weight during the course. "It may also be necessary for him to go to a hill station for an after-cure."

It has been proved beyond doubt that sanocrysin cannot bring about complete sterilisation of the patient. Even Moellgaard did not claim a complete cure by its use. The best that can be said in its favour at present is, to use the cautious language of Lyle Cummins, that "sanocrysin carefully used in suitable cases is capable of leading to the temporary arrest of the disease and to a marked improvement in general health." In fact, it is argued by some that the cases which do well by its use, may be of "such a nature that one is inclined to think they would have done quite as well without any drug treatment under the simple influence of the old rest-and-air cure, the beneficial effects of which one is always too prone to forget."

It must be admitted at any rate that sanocrysin as a chemo-therapeutic remedy against tuberculosis can in no way be compared to salvarsan in the treatment of syphilis, as some enthusiasts seem to do. The latter has rapidly and unquestionably proved its curative power in syphilis. Of the former one cannot conscientiously say so.

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MEDICAL EDUCATION.*

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THE problems of medical education are too extensive for a short paper, but in recent years so many changes have taken place, even altering the whole outlook of the medical profession, that an attempt to consider its position in this country and to define our aim and ideals is fully justified. The best methods of instruction in medicine have been the subject for consideration by a Royal Commission in England, and we ourselves have only just received a report on Indian medical colleges, which has severely condemned our shortcomings and drawn attention to the inefficiency of many of our methods. Numerous articles and papers too have appeared in medical journals, and the writings of Sir George Newman(1) and Mr. Abraham Flexner(2) are specially valuable to those who would study the subject. The true aim of a medical education, the need for training a doctor with a really scientific outlook and for the close co-operation of teaching with research, are not sufficiently realised in this country, where well-informed doctors are necessary for so many of the reforms which are now demanded. "Such public questions" says Sir George Newman "as the care of maternity, infant and child welfare, healthy adolescence, industrial hygiene, national physical efficiency and capacity and the avoidance of disease and premature death, find their answer ultimately in the progress and science of medicine, in the extension of its healing art, and in the soundness and completeness of the equipment of its practitioners."

Although the Madras Medical College was established in 1835 and a medical faculty created in 1857, the desire for cheap doctors has always influenced our educational policy. In this Presidency to-day, while there are 600 students receiving a university education at two medical colleges, 690 men and 134 women are taking at 7 medical schools the short four-year course to qualify themselves for the Government diploma. Last year 47 students qualified for the M.B., B.S. degree, 54 students for the L.M.S. degree, and 174 obtained the L.M.P. qualification. The inferior trained doctors have always outnumbered the university graduates and a reference to the Medical Register will show that the last twenty years' over-production of L.M.P.'s has resulted in a general overcrowding in the towns. It has not provided doctors for the village population. There are to-day 629 doctors practising in Madras town or roughly one doctor for every 840 people, a higher proportion than in the British Isles, where there is one doctor to 920. Other towns, e.g., Vizagapatam 68, Tanjore 43, also show large numbers of doctors and these figures take no account of the many practitioners of other systems of medicine. The majority of these registered practitioners have only the L.M.P. qualification and it is especially important that they should have had an efficient education and be able to sustain the ideals of modern medical science.

I am not concerned here with the unequal distribution of doctors. My contention is that the policy of our medical schools, which were designed first to provide a superior grade of Hospital Assistant and then extended to provide a lower grade cheap practitioner for the scattered districts, has failed. Village practice exhibits peculiar disadvantages in India and is as unattractive to the L.M.P. as to the University graduate. Over-production of cheaply made doctors cannot force distribution of cheaply made doctors and both prefer to concentrate in the towns where financial prospects are brighter. Personality, however poorly equipped, can always satisfy a public who prefer a mixture to be given with due mystery and appropriate rite for

every ailment, but such service does not satisfy the ideals of modern scientific medicine. I do not wish to depreciate at all what hospital assistants, sub-assistant surgeons and licensed medical practitioners have done as medical practitioners; their own Associations realise and are continually pointing out how handicapped they are by their inferior training. I know many who are the equals of our university graduates, but their success has been in spite of their medical school education and not as a result of it. What is called for is one standard of medical education to which all must attain. "Doubtless some will subsequently proceed to more numerous degrees and qualifications than others, and with greater gifts will produce greater results; but all doctors should be given a minimum comprehensive training based on scientific inspiration."

If we accept this finding and are prepared to advocate improvements in our system, we must have a clear vision of what we are leading to, because medical education is a serious and costly venture, and those who finance our educational schemes must be convinced that our ideals are right and the results to be attained worth the price that must be paid. In discussing therefore the problem of medical education I would first attempt to define our aim, then to discuss the basis of preliminary education on which we must work and finally to review the methods which characterise instruction in this and other countries.

The Aim of Medical Education.

In order to define our aims it is necessary that we should understand what manner of thing modern medicine is and the responsibilities which are to-day undertaken by the modern practitioner. Few of us can deny that at times our thoughts and actions yield to the spell of mysticism, perhaps the guiding principle in Chinese and certain indigenous systems. Superstition, however, has no place in modern medicine, while empiricism, an art which taught our forefathers the value of certain remedies and laid down rules of treatment, has yielded to scientific observation which has defined its limits.

If strictly defined as knowledge capable of quantitative expression, science would begin and end with mathematical physics, and most of our systems of knowledge would cease to be so called. Flexner, taking a historical and broader view, defines science as "the persistent efforts of men to purify, extend and organise their knowledge of the world in which they live. In this sense we are entitled to assume not only the science of mathematics and the science of physics, but also the science of biology, the science of agriculture and the science of medicine." The prevalent idea that a scientific education and outlook is dependent upon the part played by the laboratory is quite wrong. Science is essentially a state of the mind, a matter of observation, inference, verification, generalisation. The mind of the physician or surgeon occupied with a sick patient does not operate in any way differently from that of another scientist occupied with the results of an experiment in a laboratory. Both are using their power of observation, aided or not by special or delicate apparatus, both are assembling facts, interpreting and drawing conclusions. The main difference is that exact laboratory work is much simpler than ward work of anything like equal precision, but both the clinician and the laboratory worker are essentially scientific. "The clinic is not saved to science by laboratory methods; it includes them as simply additional weapons with which to do better, what scientific clinicians have always done, namely observe, explore, unravel."

Agreeing with this definition of medicine, what manner of man do we expect in the present-day doctor, who is a very different being from the private practitioner of pre-Lister days? The overwhelming importance of public health has added responsibilities in connection with the prevention of disease which are the inspiration of our profession. They have entirely changed the scope of the modern doctor, so that to-day the public and the State, which need competent

* A paper read before the South Indian Branch of the British Medical Association.

medical guidance, are deeply concerned with medical education and require that it should be free from quackery and incompetence. Sir George Newman in his note on medical education in England says, we require "a man of learning and knowledge in his vocation, with technical skill and medical experience; but above all a practical man with ideas and application, with a forward looking mind, able to participate in the growth and development of medical science, trained in the scientific method and inspired by the scientific spirit; in other words a man of accurate observation, of ability in experimentation and of sound judgment and interpretation." What kind of education will produce such a practitioner? "The answer to the question is complex, in a word it is university education in medicine, and the foundation of such an education is science."

Such is our aim in medical education, remembering that the function of a university education is not only to provide special technical instruction, but also to so expand the mind of the student that it may become a more perfect instrument of knowledge and progress. He must not only acquire a knowledge of those numerous facts which are necessary for the practice of his profession but his mind must be so trained that it can expand beyond the boundaries of old knowledge."

The Preliminary Sciences.

The basis or foundation of our education is science, considered as the preliminary scientific studies, chemistry, physics, and biology followed by the fundamental medical sciences, anatomy, physiology and pharmacology. The preliminary sciences are important. They afford an early discipline, the teaching of the scientific method, and they provide also the elementary data upon which the fundamental medical sciences are constructed. It is important that they should always be taught by experts, men who devote their whole time to teaching and research in these subjects, for it is here that the student is brought in contact with pure science and should learn that medicine is not a subject apart but is closely connected with advances in pure scientific knowledge. As is perhaps only natural, the expert often forgets that the medical student does not intend to become a botanist, a zoologist or a chemist and can only acquire knowledge of a small part of these vast subjects. It should be possible however to limit instruction and at the same time to give the insight into these subjects which is so necessary. The demands of the chemist especially appear to be growing more and more burdensome to the medical student, while instruction in biology is so often dominated by the type system that the student may learn little of the principles of comparative anatomy and of the laws of this important subject.

Medical College Organisation.

Medical colleges in India have grown up out of our hospitals, which originally undertook to train assistants for the medical services of the Government. The college itself at first granted diplomas, and it was not until some years later that a medical faculty of the university was formed. In this way we followed the British tradition, an example of Flexner's clinical type of medical school, as distinct from the university type which originated and grew up as part of the university in Germany, Scandinavia, Holland and many other European countries.

The clinical type of medical education, concerned mainly with the training of practical doctors, has grown up in England and France. You are probably familiar with the old British apprentice system. The young apprentice learnt his anatomy, the only exact subject of his curriculum in one of the special dissecting schools, and spent the rest of his training following his master from patient to patient. In course of time doctors in the various hospitals amalgamated and formed schools which undertook the training of students. At first and mainly from lack of funds, the

preliminary sciences were taught by clinicians, generally the juniors waiting for promotion. Later, with increased development of these fundamental sciences, came amalgamation with the university and this part of medical education was put on a sounder footing, the most important consideration being provision of whole-time teachers devoted to and experts in their subjects. Of recent years, the British Government has shown its concern in the maintenance of the quality of the profession and the Research Council, working under the Privy Council, has helped to support research workers and laboratories. There has been in fact a great movement towards a more scientific conception of medicine, and perhaps the greatest advance has been to place the clinical subjects on the same footing as the fundamental medical sciences.

The university type of medical education has been evolved in countries like Germany, Holland, Scandinavia, Denmark and others. The German university of the early 19th century emphasised research as well as teaching. The Professor of Medicine was in an exactly similar position to the Professor of Theology or of Greek, "not simply a teacher communicating a technique to successive groups of students, who in due course become practitioners of medicine. He was a master impregnated with scientific ideals, who surrounded himself with devoted disciples, serving long years as students or assistants on incomes hardly enough to sustain life." The whole system with its fully equipped institutions, clinical or laboratory, has always been well organised. The Professor is the pensionable servant of a State which controls education, while his assistants generally wait years for promotion, which results largely from original work in one of the medical sciences.

The clinical system has been essentially suitable for the British race and has produced a type of doctors second to none in the world. It has produced famous individual research workers such as Harvey, Hunter, and Lister in England. Claude-Bernard and others in France, but the outlook of the general practitioner in these countries has probably not been sufficiently scientific. The forward-looking mind demanded by Newman has often been absent, while the amount of research work turned out by their schools has been in no way equal to that of the better organised continental university systems.

These two systems have been very carefully analysed by Americans with their peculiar genius for organisation. Realising the value of the clinical system, which was the type of education originally prevalent in the New World, they have in many ways either completely changed the system or grafted on to it the better elements of the university organisation. One of the main stumbling blocks to better medical education has been the policy of honorary or unpaid clinicians, which to any degree has only existed in England and America.

It is difficult to convert honorary appointments, which are necessary in philanthropic institutions on account of expense, into paid university professorships, but this is now being done in all the more important centres in America, while in England the problem has been solved by the special institution of clinical units, in which clinical professorships are paid hospital appointments controlled by the university. In some American universities professors who draw their salaries from the university see private patients in order to gain requisite experience, but all fees are paid to the hospital and not to the professor. In other universities, where it has been difficult to institute rigid rules, various expedients have been designed and the whole situation is well worth consideration and study at a time when there is a political demand in this country for the appointment of honorary doctors to the hospitals.

Methods of Teaching.

A medical school cannot be expected to produce fully trained doctors. It can at the most only hope to equip students with a limited amount of knowledge and

endeavour to train them in the methods and spirit of scientific medicine, so that "they may be launched from the college with a momentum, which will make them active learners and thinkers for years to come." It is well to remember that medical education at the best can only be fragmentary, and that it is far better that the student should be given a full knowledge in a few subjects than an elementary or superficial knowledge of many. There is a great danger at the present time of over-loading the curriculum with too many specialities, undoubtedly necessary for the purpose of research and possibly also for the treatment of patients, but it must be insisted upon that the medical curriculum is not the place for the finished training of otologists, laryngologists and ophthalmologists. It is well also to remember that students should come to college to learn and not to be taught. Good teaching is not over-elaboration but guidance, while "a medical student who requires to be controlled from day to day or hour to hour has probably mistaken his calling."

The guiding principle of British medical education is what is known as "the block system" which insists that a student must complete his training in the preliminary and fundamental sciences before proceeding to the clinical part of his curriculum. It is desired that the student should first have a clear conception of the body in health, before any study of disease is undertaken. Perhaps it is a weak point that there is little or no special provision for honours students in most of the schools, the aim of all being to train a man as a practical doctor and after that permit him to become an expert or a specialist. In some continental schools, in France especially, there is a good deal of over-lapping of the clinics and sciences, while in others, although students are allowed very considerable freedom in the choice of classes which they can attend, their time is perhaps too much occupied with listening to and watching their teachers. They often do very little assisting and have little or no responsibility given to them. Active participation in the work of the clinic or laboratory is the strong point of British medical education.

In general it can be said there are three methods of teaching, the systematic lecture, the demonstration, and practical exercises. The systematic lecture varies enormously with the teacher and its success depends largely on his personality. The minds of students who attend too many lectures soon reach a saturation point and the modern tendency is more and more to limit this kind of instruction. No student can be really taught by continuous repetition, and the Tamil proverb, which states that "if you continually beat a stone, it will eventually move" is in no sense applicable to a scientific education. Those who befriend the dull student I would refer to another Indian proverb: "You may put a dog's tail in splints for 20 years but it will not grow straight." Demonstration is a far better method, especially when it is given to small groups of students. The tendency closely connected with our high admission rates to hold classes for a very large number of students is entirely to be condemned. Active participation of the student in practical exercises should be the main instrument in our scheme of teaching, and one in which we should encourage initiative and not over-do supervision. At some of our Indian institutions the student takes part in very few practical classes and it is quite possible at a final examination to find candidates able to recognise a slide under the microscope, without knowing how the slide was prepared and how to adjust the instrument.

The hospital ward is the laboratory of the clinical teacher who should be guided by the same scientific principles as his colleagues in the preliminary and fundamental sciences. In England the foundation of clinical units has introduced a special organisation intended to provide education of a university standard and to facilitate research in the clinical subjects. It

has acknowledged the failure of the honorary medical officer as a teacher, and has recognised the necessity of providing paid teachers in all the medical sciences, clinical as well as pre-clinical, men who can devote all their energies to the training of medical students and the advancement of clinical medicine. The student during his clinical course holds various appointments as clerk or dresser, where he becomes part of the hospital machine. He is an intelligent apprentice and is given definite responsibilities. The value of this part of his course lies in his own study of individual patients under guidance and control rather than in listening to the explanations of his teacher, while all the time he should be made conscious of the scientific efforts going on around him. Discussion and demonstrations are valuable adjuncts, but the systematic lecture is becoming less popular, and at most institutions attendance at such classes is voluntary.

Indian education as a whole, both school and college, is too much dominated by examinations. No other satisfactory system has, it is true, yet been invented which can replace this method of testing a student's knowledge, but its importance should not be over-emphasised. Examinations should be subsidiary to education and should not attempt to lead it. It is a well-known fact that the sudden announcement of an examination is the surest way of clearing our hospital and laboratories of students, whose minds are obsessed by the coming test and with whom the latest cram book or synopsis is far too popular. Most examinations are unsatisfactory, but probably the majority of examiners are reasonable sensible beings whose purpose it is to find out how much a student knows, and endeavour to put questions which will discover the extent of a student's knowledge. There are examinations, however, within our knowledge in which far too large a percentage of failure occurs and to which we ought to pay very careful attention. The fault probably lies with the size of our classes, for to inspire a class of 100 students—an average number—with scientific ideals and at the same time supervise their practical teaching is beyond the powers of our limited teaching staffs.

Research and Education.

Research to-day is an important part of medical education. The Royal Commission on University Education in London in 1913 reported "It is a necessary condition of the work of university teachers that they should be systematically engaged in research work." The spirit of investigation has always been vigorous in Western medicine; at first it was able to utilise methods of observation only, then with the invention of instruments of precision experimentation was added, and during the past decade the laboratory has so rapidly increased our knowledge that clinical research has often found it difficult to keep pace with its discoveries. In Germany and many other continental schools, research has for many years been accepted as one of the essential duties of the medical teacher, while in Britain this principle has been acknowledged in all recent university legislation. In India education and research have generally been kept apart, out of touch with each other, and their separation into separate departments has been unfortunate for both. On the one hand the research worker, often segregated on a hill-top, has been out of touch with disease, and except when engaged in a very special investigation, too academic in his ideas, which require co-ordinating with those of the clinician. The educationist on the other hand has too often passively allowed research to remain in a water-tight compartment, while his own teaching has been without imagination and his subject presented to the student as a mass of dry facts. I would again urge that there is "no greater mistake than the assumption that research 'spells' only labour with test tubes, Petri dishes, serums and guinea-pigs." The ideals and methods of both the clinician and the laboratory worker are essentially the same; both are

continually using their powers of observation, analysis, deduction and description. Your true doctor spends his life in pursuing methods of experimentation, increasing his own store of knowledge, and sometimes adding to that of others. The only difference between the two workers is that exact laboratory work is much simpler than ward work of anything like equal precision, so that the latter often fails to keep pace with the advanced ideas of the laboratory worker. Both are inspired by the spirit of discovery and the "scientist at work in his laboratory can never reap the full reward of his lonely researches without close and loyal collaboration with the clinicians." I would here protest against the practice, which appears to be growing in India, of calling institutes, generally privately owned, whose only function appears to be the carrying out of routine tests on blood, urine and other pathological fluids for busy medical practitioners—"research institutes." They undoubtedly supply a want and are in many ways valuable, but they do no original work and that they should be allowed to make such a misuse of the word "research" is deplorable.

It was a little disappointing on reading the long report of the General Medical Council's commission to find that so little has been said on the subject of research, though perhaps it was right to concentrate on many shortcomings in the way of buildings, supply of teachers and other matters, which are so obvious and yet so difficult to convince a Government of. In India the student suffers from many disadvantages, and his early training at home, at school, and at an Arts college is all against the development of scientific thought. Surely if we are to produce the forward-looking medical practitioner it is necessary that the medical student from his earliest days should be steeped in a method of critical investigation. He should not be taught a mass of hard facts, but rather be made to realise the amount of investigation that is going on and to see these methods daily being undertaken by his teachers. Until the necessity for research is put in the forefront of our scheme of medical education, we can never hope that Indian practitioners will attain a high place in the medical world.

In conclusion I would again emphasise that, revived by the work of Pasteur and Lister and influenced by the responsibilities in public health which the profession has freely undertaken, medicine has during the life-time of some of us obtained a new outlook—"A new birth." (3) The President of the Royal College of Surgeons has delightfully summed up the position as the new approach to surgery. (4) "But all my life," he says, "I have wished that my training had been different. Were my days to come again I should, after leaving examinations behind, spend the time necessary to make an adequate knowledge of human anatomy my permanent possession, and should then escape to experimental research and, in a community of like-minded people endeavour to train myself for the high destiny of a surgeon, the one man who may engage in direct research. My time would be spent in the laboratory, where a youth of plastic mind may learn the methods of approach to new problems or to new extensions of old problems; where old knowledge is merely an impulse to the search for new; where intellectual dissatisfaction is victor over narrow complacencies; where the religion of research inspires him and equips him for his work in days to come. If surgery is to be something more than a wonderful craft, if it is to be the instrument of research which I believe it to have been, and to be destined to be in the future, those who practise it must have their minds shaped and strengthened by conflict with unsettled problems, not cramped and sterilised by monotonous exercise within a narrow province of static knowledge. Their minds must be trained in the laboratory and in analogical research, so that they may be more effectively exercised both in the operation theatre and in the wards upon direct research.....The training of the surgeon must not only allow, it must urge his mind

to stray beyond the hard boundaries of old knowledge, over the edge of firm beliefs, into wide territories as yet unexplored and even undivined. In this way only is there escape from the danger which besets the surgeon in the future, the peril of a facile automatism."

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Current Topics.

India and the League of Nations.

AN interesting and novel departure is the study tour interchange of public health officers, which is at present touring India under the auspices of the League of Nations. The purpose of these study tours or "interchanges," which were first started in 1922 with the help of a grant from the Rockefeller Foundation, is not only to enable the medical officers taking part in the tours to benefit by the technical knowledge gained, but also to establish personal contact and understanding between public health workers in different countries. The objects of the present tour are "to study the organisation of the medical services in India, its statistical services and medical institutes; the work done for the control of epidemic diseases, notably malaria, plague, cholera, small-pox, kala-azar, rural sanitation and drinking water supplies, public health measures at fairs, etc.; medical research work, the army health service, and the diseases which are special to India." The members participating in the tour are as follows:—

Australia.—Dr. A. H. Baldwin, Australian Institute of Tropical Medicine.

Ceylon.—Dr. Chellappah, Colombo.

Dutch Indies.—Dr. Ch. Winckel, Weltevreden.

Federated Malay States.—Dr. A. R. Wellington, Chief Health Officer, Kuala Lumpur.

Iudo-China.—Dr. P. Hermant (Annam) and Dr. E. Jourdan (Tonkin).

Japan.—Dr. Tsunetare Fukuda (Kanagawa) and Dr. S. Nishiki (Korea).

New Zealand.—Dr. T. Hughes (Auckland).

Philippine Islands.—Surgeon C. R. Eskey (Manila).

Siam.—Dr. Luang Chedt (Bangkok).

Straits Settlements.—Dr. A. L. Hoops, Principal Civil Medical Officer, Singapore.

The "interchange" met first at Delhi on January 1st in order to hear a general account of the problems which are to be studied, and to be given an insight into the working of the Indian medical services from headquarters; also to be shown the work of the Central Malaria Organisation. The further programme is as follows:—

Jan. 3rd to 9th. Lahore.

Jan. 10th to 16th. Lucknow and the United Provinces.

Jan. 16th to 18th. Patna and *en route* to Calcutta.
 Jan. 18th to 24th. Calcutta.
 Jan. 25th to 30th. Shillong and Assam.
 Jan. 31st to Feb. 7th. Madras.
 Feb. 8th to 10th. Mysore (probably).
 Feb. 11th to 18th. Bombay.

Interchanges, like other League activities, began in Europe, but as regards at any rate the Health Organisation, the League has long ceased to be merely European and has become world-wide, and in nothing has this been shown more clearly than in the system of interchanges, which have been held in North and South America, in Africa and Japan, as well as in Europe, and included participants from the health services of practically every country in the world, whether a member of the League or not.

In general, an "interchange" or study tour consists of a period devoted to studying documents and hearing lectures, followed by visits and knowledge gained on the spot from those actually engaged in some line of health work, and concluding with a final conference of two to three days, during which the participants present reports and discuss with the organisers of the interchange and each other what they have learned during the whole period. Experience has shown that these interchanges are of advantage not only to the health administrations which send participants but also to those of the countries in which interchanges are held, owing to the exchange of views and experience, and the necessity for a health service acting as host to explain itself and its works to the foreign guests—it is notorious that one of the best ways to learn a subject is to teach it to others.

In other directions too the Health Organisation is thoroughly cosmopolitan, such as in its world epidemiological intelligence service, for which the centre in the Far East is Singapore, and by which all Far Eastern port health authorities, including those of India, benefit directly. India indeed has taken an active part in the development of the work of the League epidemiological intelligence office at Singapore, and is represented on the Advisory Council of this body as well as on the Central Health Committee at Geneva.

The Malaria Commission too of the League Health Committee has already studied the question of the best and most economical methods of combating malaria, not only in Europe but in North Africa and the United States, and has just accepted the Indian Government's invitation to extend its studies to India.

Research work has been begun by the Health Committee on the advice of its Far Eastern Advisory Council on plague and methods of oral vaccination against cholera, with which India is directly concerned and in which Indian medical officers are co-operating.

The Lady Irwin Gold Medal.

WE have been asked by the President of the Central Social Service League, Delhi, to state that the Lady Irwin Gold Medal for the study of Tuberculosis has been awarded for 1927 to K. L. Basu Mullick, M.B., Chackasi, Howrah District, for his essay entitled "The Prevention of Pulmonary Tuberculosis among Purdah Women in the large towns of India." A large number of interesting essays were sent in.

The Army in India Reserve of Officers, Medical Department.

WE have been asked by the D. A. A. G., Presidency and Assam District, to bring to the notice of European

and Indian civil medical officers with the requisite qualifications the fact that a considerable number of vacancies still exist for officers in the Medical Department of the Army in India Reserve of Officers. Details with regard to these appointments are furnished in the *Regulations for the Army in India Reserve of Officers*, published by the Central Publication Branch of the Government of India, Calcutta, 1927, at 4 annas. From that publication we abstract the following information:

The personnel of the Army in India Reserve of Officers consists of two classes; "officers" and "officers designate." The former are on the permanent cadre; the latter are members of the Auxiliary Force, India, whose names have been registered for the grant of a commission in the Army in India Reserve of Officers upon the calling up to army service of that reserve. On general mobilisation of all military forces in India being ordered, all officers and officers designate of the Army in India Reserve of Officers will be liable to be called to army service. Notification will be by *Gazette* notification, but also each individual called upon will be individually notified. If only partial mobilisation be ordered, officers and officers designate will be invited to volunteer according to the condition of emergency existing.

Applicants for the Medical Department must possess a qualification registrable by the General Medical Council of Great Britain under the Medical Acts in force at the time of their appointment. On first appointment such medical officers will be given the rank of lieutenant; to become captain at the end of three years of service, and major at the end of twelve years' service; promotion to lieutenant-colonel depending on selection. Officers who held King's commissions between the period 4th August 1914 and 11th November 1918 will be entitled to count double such period of commissioned service for purposes of seniority for promotion, etc. Other previous King's commissioned service in any branch of His Majesty's British, Indian or Dominion, naval, military, or air forces will count in full. Service as a warrant or non-commissioned officer or private will count as half commissioned service under similar rulings.

Every applicant will be required to produce evidence from his employers or other "superior authority" in civil life that his services can be spared when necessary. Applications should be made ordinarily to the headquarters of the district or independent brigade in which the applicant's normal residence is located; e.g., in Calcutta or Bengal or Assam to the D. A. A. G., Presidency and Assam District, Calcutta. Candidates for employment in the Medical Department of the Army in India Reserve of Officers will require to be approved of by the Director of Medical Service of Army Headquarters before acceptance. Each applicant will be medically examined as to his fitness for service before being enrolled.

Officers appointed will undergo 16 days' training every alternate year, but such period of training may be extended to 30 days in any one year for individuals who desire to undergo this special course. Arrangements may be made to send such officers—under the usual travelling and similar allowances—for training to the North-West Frontier area. For officers who happen to be in Great Britain at the time, arrangements may be made for their training to be carried out with British units at Home.

In time of peace, every officer or officer delegate of the Reserve will receive a retaining fee of Rs. 200 per annum, payable in arrears in January of each year. A certain outfit must be maintained, for which an initial allowance of Rs. 400 is allowed, on production of a certificate that this is in the officer's possession. On mobilisation and call to army service, officers of the Medical Department will draw pay at current I.M.S. rates. These are as follows, as laid down in Appendix "C" of the regulations.

APPENDIX "C."

Officers and officers designate of category (II).
(I. M. S. Rates.)

Rank.	Service in rank.	Basic pay.	Overseas pay drawn in rupees.	Year of total service.
Lieutenant	....	500	150	1
			150	2
			150	3
Captain ..	(i) During first 3 years' service as Captain.	650	150	4
			150	5
	(ii) With more than 3 and less than 6 years' service as Captain.	750	150	6
			250	7
			250	8
			250	9
	(iii) With more than 6 years' service as Captain.	850	250	10
			250	11
			300	12 and over.
Major ..	(i) During first 3 years' service as Major.	950	300	
			300	
			300	
	(ii) With more than 3 and less than 6 years' service as Major.	1,100	300	
			300	
			300	
	(iii) With more than 6 years' service as Major.	1,250	300	
			300	
			300	
Lieutenant-Colonel.	(i) Until completion of 23 years' total service.	1,500	300	
			300	
			300	
	(ii) During 24th and 25th year's service.	1,600	300	
			300	
			300	
	(iii) After completion of 25 years' total service.	1,700	300	
			300	
			300	
	(iv) When selected for increased pay ..	1,850	300	
			300	
			300	

With regard to leave passages for officers and families when the former are called to duty, pensions and gratuities, the rules in general follow those for the regular military services. Every officer and officer designate is required to report his address through the headquarters of the district or independent brigade concerned in January each year. The distribution of these districts and brigades is as follows:—

Peshawar District, Peshawar	Northern Command.
Kohat District, Kohat	
Rawalpindi District, Rawalpindi	
Lahore District, Lahore	
Waziristan District, Dera Ismail Khan	
Poona District, Poona	Southern Command.
Central Provinces District, Mhow	
Bombay District, Bombay	
Madras District, Bangalore	
United Provinces District, Meerut	
Presidency and Assam District, Calcutta	Eastern Command.
Allahabad Brigade Area, Allahabad	
Delhi Brigade Area, Delhi	
Baluchistan District, Quetta	
Sind-Rajputana District, Karachi	
Zhob Independent Brigade Area, Loralai	Western Command.
Burma Independent District, Maymyo	
Aden Independent Brigade, Aden.	

Officers and officers designate when going on leave are also required to notify the Military Secretary, Army Headquarters, Simla, through the headquarters of their district or brigade area concerned, that they are doing so.

India has at present no organisation corresponding to the R. A. M. C. (Territorial) Force which rendered such magnificent service during the Great War. On the other hand there are innumerable medical men in India, both European and British, who are eligible for the Army in India Reserve of Officers, Medical Department. On a study of the regulations, we would point out that the essential duties involved are not onerous; to keep up a certain small kit and equipment; and to undergo 16 days' training every alternate year. Officers will not be called to the colours unless general all-India mobilisation is enforced; under partial mobilisation only volunteers will be called for. If called to the colours in the event of war, the rates of pay and allowances are in general those of the Indian Medical Service. We doubt whether any scheme which involves less commitment on the part of those enlisting with more generous recognition of their services could possibly be devised for this country. During the Great War, one fact with regard to India became very obvious; that was that the Indian Medical Service, which first became an all-India service in 1913,—with a general all-India roster,—despite its immense services to the country and to the Empire during the war, had no general reserve. Those previously in civil employment were very rapidly absorbed into the fighting services; indeed some provinces were more than stripped bare of civil surgeons, professors, and specialists. There were hardly any to take their place.

In the event of some future war, there should be some reserve of trained medical officers. This want the Medical Department of the Army in India Reserve of Officers attempts to fill. We trust that we may appeal to those of our readers who possess the necessary qualifications to come forward and "join up." The time when the sky is clearest is the time to make provision for a "rainy day"; a future war may be incredible, but should it come, we do not desire to see repeated again the lack of personnel of 1914-15 in Mesopotamia.

Medicine and the Church.

By SIR FARQUHAR BUZZARD, K.C.V.O. M.D. (Ox.)
F.R.C.P. (Lond.).

Abstracted from the *Lancet*, November 12th, 1927,
p. 1006.

In Egypt 3,500 years before Christ with the earliest indications of the art of medicine, the art at that time was concerned only with treatment. It was practised by men who combined the offices of priest and physician and who regarded the invocation of blessings on their remedies as not the least important security for their success.

The early records of both Indian and Persian medicine emphasise their close association with religion, and suggest that sickness and recovery therefrom were attributable to the influence respectively of hostile and friendly deities.

In Greece were laid the real foundations of rational medicine, and it was left to Hippocrates, a direct descendant of Aesculapius, to develop from the prevailing methods and doctrines of his day a new outlook upon the origin and treatment of disease, which has caused him to be regarded as the greatest physician of antiquity.

To him the conditions of health and sickness were determined by seasons, climates, waters, and soils, as well as by personal habits in such matters as food and exercise. His pathological conceptions were not so happy. Four humours of the body—blood, phlegm, yellow bile, and black bile—were, according to his theory, the primary seats of disease, and health varied in relation to disturbances in their proper combination and appropriate activities. Not his least claim to

fame was his attitude of expectancy in regard to treatment. In fact his aversion to drastic remedies earned him the reproach of letting his patients die by doing nothing to keep them alive—a reproach which has lost some of its sting with the advance of knowledge.

Galen, born at Pergamus in A.D. 131, was destined to influence the progress or perhaps it would be more correct to say, the stagnation of medicine for from 12 to 15 centuries. As an expositor of the medical knowledge of his time, as an anatomist and skilled dissector of the bodies of lower animals, and as a practical physician his reputation must always stand pre-eminent. As a physiologist and pathologist his contributions were of less value, and his dogmatism in regard to these subjects, fostered by the atmosphere of infallibility which pervaded both medicine and the Church for so many centuries, was a standing menace to all progress during the whole of that time. Galen's doctrine did not come into its full power until his writings, having been translated into Latin, began to be studied in the West, with the result that by the sixth or seventh century his name and authority began to dominate medicine and thereafter kept it in chains for another thousand years.

From the early Middle Ages the religious orders were the custodians of the degenerate knowledge and practice of the healing art inherited from the later Roman authors until the curious mixture of ancient science with the black art, characteristic of monastic medicine, was superseded by the Hippocratico-Galenic revival. The latter doctrine survived until the medical reformation, which took place very little later than that of the Church and which is so closely associated with the name of Vesalius, the founder of modern anatomy, who was condemned by the Inquisition as a sorcerer, and with that of William Harvey, the father of modern physiology. But those who took part in the reformation of medicine were not only exposed to the persecution of the Church, but were bitterly opposed by the disciples of Galen, and Vesalius himself did not escape the hostility of the latter when he published his monumental work on human anatomy in 1543.

The Church during the Middle Ages exerted its influence to uphold the Galenic doctrine, which presented no inconsistencies with the Christian faith and which dogmatically provided an answer to every question. Comment was allowed and commentators abounded. Criticism, on the other hand, was looked upon as a species of heresy and critics shared the fate of religious heretics. Research and experiment were regarded as closely akin to sorcery and witchcraft.

But medicine owes the Church a debt of gratitude for the performance of at least two valuable functions during the dark years of its history. The monastic orders were responsible for preserving the ancient literature of our profession which would otherwise have been lost, and they were pioneers in the establishment of hospitals which eventually formed the basis of many famous and productive medical schools.

Dr. Arnold Chaplin writes:—

"In early times, before the foundation of the Universities, the art of Medicine was largely the province of the Church, but in 1131, the Council of Rheims prohibited the regular clergy from devoting their attention to physical conditions, and after this edict the regular clergy confined themselves to prescribing medicines. In 1139, the Council of the Lateran prohibited physicians from administering to the wants of the body before the spiritual needs of the patient had received attention. . . . In 1422 the first enactment concerning the practice of medicine appears upon the statute book. 'No one shall use the mysteries of fisyk, unless he hath studied it in some University and is at least a bachelor in the science. The Sheriff shall enquire whether any one practice in this country contrary to this regulation; and if any one so practice he shall forfeit £40 and be imprisoned.' The Church, however, still continued to exercise some authority, for in a statute of 1511 it is stated that 'except for those

graduating in Medicine at Oxford and Cambridge, all desiring to practise medicine or surgery in London and seven miles around must be approved, after examination, by the Bishop of London or the Dean of St. Paul's with, in the case of Physicians, the assistance of four doctors in physick, and, in the case of surgeons, of other expert persons of that faculty.'

It is interesting to trace the gradual development of a new attitude towards research. Thus the secrets of Nature came no longer to be regarded as sacred and knowable only to the Almighty, when difficulties were encountered in the attempt to unravel them. There arose, on the contrary, a spirit of inquiry undeterred by obstacles and no longer trammelled by the belief that the search after knowledge was incompatible with the Christian faith. For example.

Vesalius (1514—1564).—"The septum of the Ventricle abounds on both sides with little pits impressed in it. Of these pits, none, so far at least as can be perceived by the senses, penetrate through from the right to the left ventricle, so that we are driven to wonder at the handiwork of the Almighty, by means of which the blood sweats from the right into the left ventricle, through passages which escape human vision."

Harvey (1578—1657).—"When I first gave my mind to vivisections, as a means of discovering the motions and uses of the heart, and sought to discover these from actual inspection and not from the writings of others, I found the task so truly arduous, so full of difficulties, that I was almost tempted to think, with Frascatorius, that the motion of the heart was only to be comprehended by God. At length, and by using greater and daily diligence, having frequent recourse to vivisections, employing a variety of animals for the purpose, and collecting numerous observations, I thought that I had attained the truth."

At the time when Harvey was engaged on his life's work, the result of which was to deliver from darkness into the light of truth the secret of the circulation of the blood, the Church found it desirable to forbid the clergy to attempt to cast out devils by fasting and prayer, except by special licence from the bishop. The tercentenary of the publication of Harvey's "De Motu Cordis," the monograph giving to the world his great discovery, is to be celebrated in a befitting manner in 1928.

Since his time the science of medicine has steadily progressed, partly as the result of untiring research at the bedside, in the post-mortem room, and in laboratories, and partly as the result of the rapid development of such ancillary sciences as those of physiology, anatomy, chemistry physics, biology, and bacteriology. Progress at first was slow, hampered by tradition, by prejudice, and by the very human mistake of regarding hypotheses as final conclusions instead of using them as a basis for research. In the last 100 years the wheels of progress have moved much more rapidly, and, our conception of medicine as a profession has completely altered since the days when the physician-priest of Egypt essayed blindly to cure the sick with a mixture of blessings and herbs.

For more than a thousand years, during which the Church shared the practice of medicine with physicians, and dominated its methods, during which she was at the height of her spiritual power, and during which millions of the sick and suffering must have passed through her hands, there was no material advance in the knowledge of disease, of its cure, or of its prevention. Moreover, from the records of those centuries in which the Church had every facility and every opportunity of proving her gifts, there has survived no evidence in support of the claim that spiritual healing of organic disease is a practical proposition, or that spiritual healing differed, either in its essence or its efficacy, from other methods based on suggestion and faith, religious or otherwise.

On the other hand, the last two or three hundred years have witnessed a gradual separation of the paths of medicine and of the Church, and synchronous with

that process the advances of medicine in regard to the diagnosis, treatment, and prevention of disease have only been equalled by the remarkable progress made in other branches of science which threw off the fetters of the Church about the time of the Reformation.

The weight of authority in the English Church is now against the claim to heal "organic" disease. Thus the Committee of the Ministry of Healing appointed by the Archbishop of Canterbury in 1920, say:—

"Our Committee has so far found no evidence of any case of healing which cannot be paralleled by similar cures wrought by psychotherapy without religion and by instances of spontaneous healing which often occur in the gravest cases in ordinary medical practice."

Sir Farquhar deals with the subject of Faith which says the writer of the Epistle to the Hebrews, "is the substance of things hoped for, the evidence of things not seen."

This definition is not lacking in beauty and simplicity of language or of conception, and it has the advantage of offering to us a meaning applicable alike to faith in God and faith in man.

The scientist cannot fail to recognise the reality of faith and the immense power for good and happiness which it exercises in the lives of a large proportion of the community.

The Pathology of Subtertian Malaria.

By DR. IAN MACKENZIE.

SOME very interesting observations on the pathology of subtertian malaria are recorded by Dr. Ian Mackenzie in the *Journal of Tropical Medicine and Hygiene* for August the 16th, 1927. These observations were collected in Sierra Leone, the West Indies, and Venezuela over a period of nine years; no less than 1,150 cases having been observed.

"Examination of the record cards bring out the following points:—

(1) Anæmia is marked and progressive during the first week of the attack, but as a rule recovery in new cases is prompt.

(2) The blood-pressure at some period of the paroxysm is lowered almost invariably. There is a marked relationship between a low blood-pressure and localization of symptoms.

(3) After a preliminary leucocytosis, leucopenia is the rule, and in the majority of the readmissions there is a relative and absolute increase in the large mononuclears.

(4) The coagulation time of the blood is sometimes increased, sometimes unaffected, and more rarely decreased.

(5) In the majority of the cases rigors are not marked.

(6) The temperature charts are very irregular in first attacks, but become more frankly intermittent in the relapses.

(7) The rate of hæmolysis is less marked in the relapse, although the anæmia is as a rule more profound.

(8) Where quinine prophylaxis (5 gr. daily) has been given, the clinical symptoms of an attack are often more intense, and the immediate reaction to quinine less effective than when no prophylaxis is employed. This is more noticeable in first attacks.

(9) The addition of iron and arsenic to the prophylactic quinine, although it did not materially decrease the number of admissions, diminishes the amount of anæmia associated with the attack.

(10) In areas where malaria-infected mosquitoes are numerous, quinine in 5-gr. doses is insufficient to prevent an attack. By doubling the daily dose the incidence is much reduced (40 per cent. less in one locality).

(11) Quinine treatment by the mouth, provided there is no vomiting, seems to be as efficacious as by any other route."

Turning to the old standing and much-discussed question of the causation of relapses in malaria, the author concludes that the whole weight of evidence in his researches is against the view put forward by Schaudinn many years ago that relapses are due to the production of merozoites by parthenogenesis on the part of the macrogametocytes. He writes:—

"(1) Despite Karroway's observation that he found parthenogenesis to occur in *P. vivax* at the height of the paroxysm, most careful examination of thousands of films and hanging-drop preparations in a large number of malarial cases has failed in every instance to show anything suggestive of retrogressive schizogony. When gametocytes existed in the peripheral circulation, a double infection of a corpuscle with a schizont and a gametocyte was not infrequently observed.

(2) Post-mortem examination of smears from the viscera—spleen, liver, brain, bone-marrow—in cases known to be free from the clinical manifestations of malaria for at least three months before death, but all of whom were chronic malaria subjects, showed the capillaries filled with blood containing parasites and leucocytes with pigment: the red cells of the splenic pulp contained schizonts and crescents.

(3) Provocative attacks of malaria were produced by the intravenous injection of adrenalin in three out of six cases whose peripheral circulation showed an excess of large mononuclears and pigmented leucocytes, but no plasmodia.

(4) Splenic puncture in ten cases with moderately enlarged spleens, in whom the clinical manifestations of malaria were absent, and crescents only could be found in peripheral blood, demonstrated the presence of sporulating forms in the films of six.

(5) A Syrian was admitted into hospital with amœbic dysentery. On examination, his blood was found to be swarming with crescents, and, in spite of prolonged examination of more than 100 films, no plasmodia could be discovered. There had been no clinical evidence of malaria for many months. By means of a Pravaz syringe, blood from this subject was injected directly into the basilic veins of five members of his family who lent themselves for the experiment in quantities of 1 c.c., 2 c.c., 4 c.c., 6 c.c. and 8 c.c. In no case did these injections produce an attack of malaria. Some time later, half a c.c. of blood containing plasmodia from a case of subtertian malaria was injected into this Syrian. Within ten days he was readmitted with a typical paroxysm, his blood swarming with plasmodia. Finally, half a c.c. of his blood, containing the plasmodia, was injected into the members of his family previously inoculated with crescents. Four out of the five developed an attack within two weeks.

While the series of experiments and observations described cannot be considered as conclusive evidence against parthenogenesis, I submit that they are sufficiently suggestive to make us hesitate before accepting Schaudinn's view.

Of the fact that quinine in sufficient dosage kills off the crescents in time, there can be no doubt. One series of cases, 100 natives, whose blood showed numerous crescents but no plasmodia, were given 30 grains of quinine a day with the following results:—

Shortest time required for the disappearance of crescents, five days; longest time for their disappearance, twenty-eight days; average time required, 17.5 days."

Blood Transfusion in Sprue.

By DR. G. C. LOW, M.D., F.R.C.P.

and

W. E. COOKE, F.R.C.S., (Ire.), D.P.H.

The Lancet, 5th November 1927, p. 960.

THE following are abstracts from this very interesting paper:—

In the later stage of sprue a blood picture very like that seen in pernicious anæmia often develops. This

hæmolytic type of the disease is very dangerous and often fatal.

A detailed account of the blood in such cases was given by one of us (G. C. L.) as long ago as 1912. It was there pointed out that in the later stages it might be practically impossible to differentiate the blood picture of sprue anæmia from that of true pernicious anæmia. On this picture some have argued a relationship between the two diseases, or even their identity, but sprue is a definite entity with a symptomatology and pathology of its own and is not pernicious anæmia.

Transfusions of whole blood have been used for some time in pernicious anæmia, septicæmia, loss of blood from hæmorrhage, often with very beneficial results, and recently a patient suffering from the hæmolytic type of sprue was transfused with whole blood just before coming to us. Under our treatment the sprue improved and he apparently completely recovered, but after leaving us and living at home for some time he relapsed and again developed a very severe type of anæmia. We therefore took him back into the Hospital for Tropical Diseases and, his wife being a suitable donor, her blood was used for the transfusion.

A Short Résumé of the Cases.

Case 1.—European male, aged 58. Residence abroad. India and Mesopotamia. Previous illnesses: enteric fever, 1888; dysentery, 1890 and 1895.

Sprue began in 1917. By 1923 the disease had so progressed that the patient was admitted to a general hospital in England, his blood count reading: red cells 600,000, hæmoglobin 22 per cent. Three whole blood transfusions performed during a period of 27 days resulted in a rise of the red cells to 800,000, hæmoglobin 27 per cent. Four months later the count read: red cells 1,460,000, hæmoglobin 56 per cent.

When transferred to the Hospital for Tropical Diseases, London, on April 10th, 1924, he was still very ill and wasted. Weight 6 st. 12 lb., and the blood count was red cells 2,440,000, hæmoglobin 65 per cent. With our usual line of treatment he improved so much that he was able to leave hospital on August 1st, 1924, his weight having risen to 11 st. 1 lb., and the count to red cells 4,160,000, hæmoglobin 80 per cent.

During the following two years the patient returned to hospital twice for short periods of treatment.

On July 7th, 1926, the blood count had fallen to red cells 3,000,000 and hæmoglobin 75 per cent.; poikilocytosis and nucleated red cells were present, but after readmission to hospital on that date the decline continued in spite of the usual methods of treatment, until August 6th, 1926, when it was decided to transfuse with blood in the hope of checking it. The count on that day was red cells 2,300,000 and hæmoglobin 65 per cent.

The wife acting as donor, 700 c.cm. of whole blood were given by the citrate method. No rigor occurred, but the transfusion was followed by a rise of temperature to 100°F. Three days later a further decline had taken place, the count reading red cells 2,000,000, hæmoglobin 65 per cent., and a trace of albumin was found in the urine. By September 7th following—that is, a month later—the red cells totalled 4,200,000 and hæmoglobin was 80 per cent., and the patient was discharged in the following week with a count of 4,700,000 red cells and 85 per cent. hæmoglobin, feeling much better in every way. He has reported at intervals since his discharge and was keeping well up to September, 1927.

An even more striking case is the following:—

Case 2.—Mr. X., an old case of sprue, who had never been very anæmic, went home to Scotland. Apparently he relapsed there and rapidly deteriorated, his blood count falling and his general condition becoming alarming. It was then decided, though the risk was considerable, to bring him to London, where he arrived on the morning of October 2nd, 1926.

Previous Illnesses.—Malaria and dysentery, 1888; syphilis and gonorrhœa, 1891; hepatitis, 1902; cholera, 1917. Ptomaine poisoning, 1919. Had lived in India and New Zealand.

Present Illness.—In 1920 diarrhœa began, with light-coloured stools, sore tongue, and loss of weight, the onset of sprue, so in 1921 he returned to England.

On December 8th, 1922, patient was admitted to the Hospital for Tropical Diseases, after seeing one of us, and he had to return to hospital on five subsequent occasions. On each of these he responded to treatment for the sprue with varying success, and when in hospital the specific infection was treated with potassium iodide, N.A.B., and bismuth. On May 20th, 1926, he was discharged from hospital to spend the summer in Scotland, his red cells numbering 4,500,000; hæmoglobin 85 per cent.; weight 13 st. 12 lb.

The following September (1926) he relapsed so rapidly that on October 1st the task of bringing him from Scotland to London was one of considerable difficulty and risk. For three days before the commencement of the journey he had been vomiting continuously and was only conscious at intervals.

On his arrival at the Hospital for Tropical Diseases at 8-45 a.m. on October 2nd in an unconscious condition, 10 oz. of 5 per cent. glucose saline solution were at once administered intravenously. The blood count on admission was: red cells 940,000, hæmoglobin 20 per cent. As no return to consciousness or marked improvement followed the glucose injection, it was decided to transfuse with whole blood, and at 2-15 p.m. 730 c.cm. of citrated blood was given. The effect was dramatic. As the patient's colour improved he regained consciousness, recognised doctor and sister, and was talking naturally before the transfusion was finished.

At 3-45 p.m. the patient asked for some Benger's food and no vomiting followed. The transfusion was followed at 4-15 p.m. by a rigor and a rise of temperature to 102°F. at 6 p.m., falling to 98°F. at 11 p.m. The following day he had so much improved that it was difficult to imagine he had been so ill on arrival.

On February 10th, 1927, the patient had picked up from his wasted condition. Seventeen days after admission his weight had been 12 st. 7 lb., and by the date of discharge it had reached 14 st. 2 lb. At the same time the blood showed 5,240,000 red cells and 95 per cent. of hæmoglobin. Up to the time of writing he has had no relapse.

The following a somewhat similar case, is also interesting.

Case 3.—European male, aged 67. Residence in India for 43 years. Family history good, no asthma. Previous illnesses: measles, mumps, varicella, enteric fever (at 14 years), malaria; no definite history of dysentery.

In 1920 diarrhœa commenced with flatulent dyspepsia, and was diagnosed as colitis. Improvement occurred on return to England on holiday, but on the voyage to India again in 1925 the diarrhœa recommenced, and for the year previous to admission to the Hospital for Tropical Diseases the stools had been white and bulky.

On entering hospital on July 5th, 1927, he was very wasted and anæmic, and his tongue was glazed and flabby and sore; the abdominal wall was wasted, but the abdomen was not distended; the liver was slightly diminished and he showed a typical picture of severe sprue. Blood count on admission was red cells 2,540,000, hæmoglobin 65 per cent.; weight 7 st. 3 lb.

As he did not progress under the usual treatment, and as four days later it was found that the red cell count had fallen to 2,020,000, it was decided to transfuse with whole blood.

The patient was found to belong to group III, a suitable donor was procured, and on July 12th, 1927, the patient's serum was tested against the donor's blood and no incompatibility was noted. The citrate method was used, with all the usual precautions, the blood being given by the needle and funnel method into the right cephalic vein. Transfusion was started at 2-30 p.m. and at once symptoms of hæmolytic and

anaphylaxis manifested themselves. The needle was at once withdrawn, not more than 5 c.cm. having been given. The symptoms, in order of appearance, were: coughing, nausea, flushing; coldness of the skin, which became clammy, cyanosis of lips, vomiting, pulse accelerated but regular and feeble; severe pain in lumbar region; diarrhoea and shivering. The diarrhoea and shivering persisted at intervals till 5 p.m. At 6 p.m. the temperature had risen to 102°F., but by then his condition had improved. The following morning he was much better, he had had some sleep during the night, and was able to take fluids. No micturition occurred till 5-30, an interval of 26½ hours after the commencement of the transfusion, and then he passed 5 oz. of smoky urine containing albumin, a few red blood cells, hæmoglobin, and both blood and hyaline casts. He continued to make satisfactory progress. Six days later: red cells 2,200,000, hæmoglobin 65 per cent., albumin and granular casts present. Ten days later: red cells 3,040,000 hæmoglobin 70 per cent. Twenty-one days later; red cells 3,840,000, hæmoglobin 75 per cent., albumin, no casts. Forty-one days later: red cells 4,460,000, hæmoglobin 85 per cent., albumin, faint trace. The weight was 7 st. 13 lb., a gain of 10 lb., and he was able to walk a little in the ward. His progress is still satisfactory.

Case 1 is interesting as showing how useful transfusion can be in the most advanced cases. A red count of 600,000 with 22 per cent. hæmoglobin indicates a condition from which few could hope to recover. After the transfusions the patient kept well until three years later, when another transfusion became necessary. Up to the present this patient maintains satisfactory health (one year later). Three years is the longest period that has elapsed since transfusion in any of our sprue cases, but there is reason to expect that some of our later cases may recover completely, and require no further transfusions.

Case 2 is an example of the dramatic effect sometimes attained by transfusion. The rapid recovery from unconsciousness and the subsequent steady improvement greatly impressed all who saw the case, and convinced them that transfusion is essential in all such severe cases.

Case 3 presents many features of interest, the chief being: (1) the occurrence of the hæmolytic and anaphylactic symptoms, although no incompatibility was noticed when the bloods were previously tested; (2) the rapid recovery from the sprue condition though so small an amount of blood had been injected.

Conclusions.

Blood transfusion has now been established as a most important method of treatment in sprue. It would appear that the amount of blood given is not the important factor, though in cases like No. 1, where the patient's blood had fallen to a dangerously low level, a large amount of fresh blood would undoubtedly be a distinct benefit. The important factor seems to be that the blood injected stimulates the blood-forming tissues of the body. How this takes place is a matter for further investigation, but the blood seems to act in somewhat the same manner as do proteins injected in "protein shock" treatment.

In patients who have sustained a slight rigor or pyrexia following transfusion, the beneficent results appear to be as good and perhaps even more rapid in their appearance than in those cases where no rigor or pyrexia has appeared.

Cases of hæmolysis or anaphylaxis are fortunately rare. Case 1 had no symptoms, although the second transfusion, given three years after the first, might have caused them. Case 3 gave no history of previous injection of serum or protein and had no asthmatic history, and yet such severe symptoms occurred that life was only preserved by the prompt recognition of the onset anaphylaxis and hæmolysis and immediate cessation of the transfusion.

As regards the treatment of sprue generally, several points of interest may be mentioned: first, the use of liver extracts in the form of liver soup; and secondly, the use of the so-called pulvis bataviae. Recently Dr. George Minot, of Boston, in an address delivered before the American physicians, claimed that liver, and especially a fractional alcoholic extract thereof, is a specific in the treatment of pernicious anæmia. In the discussion that followed Dr. Bailey K. Ashford pointed out its remarkable efficacy in the treatment of the so-called "pernicious anæmias" of sprue. The use of liver in sprue goes back for 30 years or more. Castellani states that it is an old native remedy in Ceylon. It was extensively used by Sir Patrick Manson, and one of us (G. C. L.) has also used it for the last 20 years in an extensive practice of this disease. Though no very startling results can be claimed for it, it does seem to do good, and there is no reason why it should not, as the liver is shrunken in sprue and very probably does not secrete properly. We may, then, by giving liver extracts, supplement this deficiency.

Batavia powder is a specially prepared organic compound of lime, with traces of iron and manganese. It contains no vegetable matter. It is the ancient "Peter Sys's cure," which was used extensively in Singapore in the old days. Originally supposed to come from cuttle-fish bones, it is now prepared from ordinary lime and is a proprietary preparation still. It may act by supplementing the deficiency of lime which is present in the disease, but it also seems to act beneficially in controlling the diarrhoea. It may be given in 1 drachm doses twice or three times a day and continued until the stool becomes solid and well formed. It seems to have a real use in the treatment of the disease.

Solutions of Dyestuffs in Glycerine in Surgical Therapeutics.

By VALDEMAR PLETH, M.D., Ph.D.

Americal Jour. Surgery, 1927, Vol. II, p. 239.

FROM the researches of Compton and others it would appear that glycerine has an antiseptic rather than a bactericidal action, and is far less toxic to leucocytes than to bacteria. The author, who has used propyl alcohol for years in the applications of antiseptic dyes to wounds, found that its use was sometimes painful, and hence investigated the possibility of using glycerine instead. Thus the action of malachite green, fuchsin, crystal violet, and brilliant green in solution in 30 per cent. glycerine was investigated. The cases experimented upon were chiefly cases of empyema and of septic arthritis. The following are his conclusions:—

Glycerine is a very efficient antiseptic, yet not toxic to the leucocytes in strength below 41 per cent.

Glycerine indicates a bacterial indifferent zone of cytobacterial activity.

Glycerine-dyestuff suspensions cause no irritation in the most painful wounds.

Suspensions of dyestuffs in 25 per cent. propyl alcohol have proved to be excellent skin disinfectants.

The best bactericidal results can be had by applying the solutions hot.

Not only are the dyestuff solutions more toxic for Gram-positive bacteria when applied hot than when applied cold, but also when applied hot they become bacteriostatic for certain Gram-negative organisms on which, when applied cold, they are quite without effect.

The healing time of infected wounds is materially reduced by this method.

The Baths of Bath.

AN interesting event of last year was the opening at Bath of the Old Royal Baths, an extension to the existing baths. This building was designed by John

Wood in 1777, and to a large extent the lines of the original design have been retained; the new extension providing much needed additional accommodation, delightful in its quiet and restful comfort, a little gem of Georgian setting, its use perpetuating the use of the Hot Spring with its history of nearly a thousand years of healing.

The water in the Hot Spring issues at a temperature of 120°F., and it has been found possible, by sinking a small glass-lined well, to obtain the water by natural flow direct from the spring without recourse to pumping. The water differs from that in the King's Spring, which is served in the Grand Pump Room, chiefly in its smaller content of calcium, sodium sulphate, and iron, and in its larger proportion of sodium chloride.

This new department of the Bathing Establishment has been set apart for intestinal douche treatment (Plombières douches), for which the Bath Waters have proved to be particularly suitable. At first used almost entirely in cases of colitis, Plombières douches have lately been largely prescribed in the treatment of rheumatic diseases, and their growing use has necessitated the provision of more and more accommodation. Special attention has been given at Bath to the administration of intestinal douches, the staff receiving the most thorough and careful training, and by concentrating the treatment in one building, specially designed and fitted with apparatus embodying every improvement science and experience can suggest the highest possible efficiency will be attained.

No case can be taken without medical advice and after every treatment a full report is sent to the physician sending the patient. Cases are sent for diagnostic as well as for treatment purposes, and when desired specimens can be sent for examination and report to the Central Laboratory, which almost adjoins this department of the Baths.

For the other form of treatment to be given at the Old Royal Baths, the historic Hot Bath will be used. John Wood's beautiful little pool bath, with its well proportioned balustrade and graceful carving, has been carefully restored, the only alteration being the addition of a glass roof to enable the bath to be used under any climatic conditions. Even this, when the weather is favourable, may almost all be thrown wide open to the sky.

The treatment, which consists in active and passive re-educative movements, is chiefly used in cases of spastic and flaccid paralysis, and has also been found useful in Parkinsonianism. Experience gained during the war established the efficacy of this method. The object is to allow voluntary exercise to be taken in a medium which will support the limbs and therefore reduce strain and fatigue. The heat (100 degs. to 101 degs. F.), reduces spasm where present and prevents any feeling of chill, while at the same time the patients are obtaining the benefit of immersion in the mineral water. By means of specially designed lifting and travelling apparatus even helpless patients may without the slightest discomfort be raised in the dressing room and carried out over the pool and gently lowered into the water for the movements. Provision is also made for walking exercise in the bath.

Reviews.

LEAGUE OF NATIONS. HEALTH ORGANISATION. PRINCIPLES AND METHODS OF ANTI-MALARIAL MEASURES IN EUROPE. SECOND GENERAL REPORT OF THE MALARIAL COMMISSION. Geneva: 1927.

It will be remembered that after the war malaria in the countries of Central Europe assumed severe epidemic proportions and a Malaria Commission of the

Health Organisation of the League of Nations was appointed to tour these countries and inspect and report on the incidence of malaria and on the measures likely to be possible and effective in combating the disease. In their report on this tour the Commissioners came to the conclusion that for the countries in Europe mainly affected by malaria, the most hopeful measures are those that might be termed "domestic," that malaria as they found it was essentially a house disease and that grandiose schemes of larval destruction on a large scale are not only unlikely to be really successful but that these would be entirely beyond the means of the countries involved. In the present report the Commission reviewed the situation again and state their conclusions and views on measures for dealing with malaria in Europe. This forms the main section of the report, but there are other sections dealing with the arrangements for studying malaria and a discussion on its prevention and control.

The countries in Europe seriously affected are Spain, Italy (and Sicily), parts of Russia, and the group of Central European States bordered by Austria and Hungary on the North, and Greece on the South. The Commission toured these parts, and also Palestine. They give a sober warning against undue optimism in launching anti-malarial campaigns without due consideration and investigation of the problems involved. Most of such campaigns are records of exaggerated expectations followed by disappointment and abandonment. Continuous and renewed study of the disease in all its aspects must still be the prelude to action. The discovery of the mosquito cycle has not put in our hands any single simple method of malarial prevention capable of universal application. Sir Ronald Ross after his recent tour in India will probably now acquiesce in this. The Commission point out that complete eradication of malaria is an ideal seldom obtainable, while measures for the reduction in the incidence and severity of the disease are within the bounds of possibility and that at present the bounds of possibility should not be overstepped.

The common belief since Ross' discovery is that to reduce malaria, it is necessary to use some method involving this discovery. The Commission consider this belief a "tyranny which has been exercised over man's minds during the last thirty years." In England, the Netherlands and Denmark, malaria was abolished or reduced long before the mosquito carriage of malaria was known and without any reduction of anophelines. There is no method of choice in malaria control superior to all others; and every place, almost every village, almost every house is a distinct problem by itself to be studied and solved as such.

Measures of control cannot be begun without preliminary study and continuity of work and inspection, and periodic estimations of the malaria are essential. Having chosen the most suitable method or methods, these should be pushed beyond what the commission call the "minimal effective degree of perversion." By this is meant that a certain amount of action is necessary before any reduction in malaria is perceptible. Readers of Ross' *Prevention of Malaria* are familiar with his treatment of this aspect of the problem by mathematical methods. A slavish copy copying of one country's methods by another should be avoided. "Bonifaction" for instance even in Europe is misunderstood. It is mainly considered to be an anti-larval measure purely and simply. It is nothing of the sort. It is an improvement in the land to make it cultivatable, followed by intensive cultivation and permanent human settling, with an economic improvement in the conditions (housing, feeding, education, etc.), of the actual settlers. "Bonifaction" exploited by financiers without improvement in all these conditions of the agricultural labourers has been and will be a failure in reducing malaria. Nevertheless even where *Anopheles* prevalence has not been reduced at all, "bonifaction," correctly conceived and carried out in its entirety, has resulted in distinct malarial reduction. Italy has

never placed anti-larval measures in the forefront of her programme. For European conditions, the Commission recommend "direct" measures, viz., killing of the parasites in man by treatment, and killing of the parasites in the mosquito by destroying the adult female anophelines in houses. They advise these as routine measures in preference to all anti-larval methods, which they class as "indirect" measures. These "direct" measures they consider indispensable.

"We are persuaded that the wide distribution of quinine is a public duty, which whenever and wherever necessary, should be organised and paid for by the State."

The Commission are therefore impressed with the necessity of utilising the general practitioner as a "part time malarial officer," but he must be specially educated in malarial work. In Europe, where the local practitioner has a full knowledge of malaria the malarial incidence can be ascertained, but otherwise the Commission found that in very malarious places the local practitioners returned "nil" for spleen and parasitic indices. It is the general practitioner alone who can carry out the first of the "direct" measures above.

This now has a distinct bearing on the Indian problem. We in India do not make use of our practitioners enough in preventive work, and a scheme of malarial control in India should certainly include these practitioners, where they have had the necessary training and experience.

That there is at present no royal road and no short cut to the control of malaria is the burden of the Commission's opinion.

The Commission insists on the necessity for efficient education of the general practitioner in malarial diseases.

The conclusions of the Commissions are perhaps not as rosy as might have been hoped for, but they have done a great service in stating clearly the present position and in refusing to be carried away by unreasonable hopes; what is true of malaria is true of all disease, "the fight against malaria must be waged not as a separate and isolated task, but as part of a social, economic and sanitary campaign directed by an enlightened health service which is able to obtain assistance from other government departments and from unofficial agencies and to secure continuity of action in unity of purpose."

Though the Commission's report refers entirely to Europe, its conclusions and arguments are by no means without interest or application to India. The economic factor in malaria has been insisted on by Christophers and Bentley, but the conditions of land tenure peculiar to India militate against obtaining the full benefits of "bonifaction": the anti-larval school is exemplified in the East chiefly by Sir Malcolm Watson, Strickland and Christophers.

Section II gives a brief but adequate account of the methods of artificial infection of mosquitoes and man worked out by James, of malarial surveys and estimation. Under "prevention and control" they advise the formation of an "Anti-malarial Advisory Committee" in every country, on which would sit representatives of all departments. They insist on adequate treatment and agree that a mixture of alkaloids is cheaper and just as effective, if not more so, than purified quinine. In the Netherlands liquid paraffin is preferred to all other larvacides for large areas, while for rivers and running streams Paris green has proved better.

Anti-larval methods have been found successful only in two areas, viz., in the dry waterless hills of the Kant mountains and in the town of Jerusalem. Koch stated "It is beyond human power to destroy or even reduce considerably a species of insect like the Anopheles in large districts."

The Commission agree with this dictum and recommend anti-larval methods on a large scale only in specially suitable and selected districts where breeding places are small in number and easily controlled.

The eradication of malaria in India is probably a hopeless proposition for many years, but its reduction should be possible; but how can there be obtained that "minimal effective degree of perversion" of anti-malarial work short of which little or no result may be expected?

A. D. S.

THE LISTER INSTITUTE FOR PREVENTIVE MEDICINE. COLLECTED PAPERS. VOL. XX; FOR 1923-24. VOL. XXI; FOR 1924-25. VOL. XXII; 1925-26.

We have received through the courtesy of the Lister Institute copies of these three splendid volumes, which—we presume—are for personal and private distribution to workers interested in the same or similar lines of research work. The custom of binding together into one large annual volume reprints of the contributions made to the literature by the different members of the staff of a large medical research institute is an exceedingly good one; for it enables such institutions to exchange views, ideas, and information in a much more efficient and thorough manner than when exchanges are left to individual members of the staff.

These volumes include many notable additions to medical knowledge. Each is divided into two parts; Part I, bacteriological, epidemiological, pathological and statistical papers; and Part II, biochemical, physiological and zoological papers. In Vol. XX, especially notable papers are Dr. J. A. Arkwright's studies of the bacteriophage; Dr. A. W. Bacot and Dr. C. J. Martin's study of the respective influences of temperature and humidity upon the survival of the rat flea (*Xenopsylla cheopis*) away from its host; a study of tularæmia in man from laboratory infection by Drs. Ledingham and Fraser; and above all Major Greenwood's valuable account of the life and scientific work of A. W. Bacot, whose loss was a severe blow to medical research, and whose splendid pioneer work during and after the war on trench fever and typhus did much to clear up the problems of the ætiology and transmission of these diseases. In Part II, there are included no less than 28 papers, notable amongst which are the nutritional studies by Dr. Harriette Chick and Dr. Margaret Boas; the vitamin studies by Dr. Goldblatt and his colleagues; and Dr. Lumsden's studies of the regulation of respiration.

In Vol. XXI, Dr. Arkwright's short paper on the Rickettsia as ætiological factors in disease is of special interest; also Dr. Mary Cowan's studies on the variation in virulence of different strains of streptococci. Dr. Ledingham contributes a detailed study, illustrated by colour plates, of the reaction of the skin to vaccinia virus, and a short note reprinted from the *Lancet* on the relationship of alastrim to variola, as studied from the experimental point of view. Part II includes 26 papers, almost all of them dealing with nutritional problems, vitamins, and metabolic studies.

In Vol. XXII, the most important reprints perhaps are those of the Harben Lectures, 1925, delivered by Professor J. C. G. Ledingham. The first deals with some problems of natural immunity and prophylaxis; the second with the carrier problem in relation to enteric fever and diphtheria; the third with studies on variola, vaccinia and avian molluscum. The relationship of the sexual glands to metabolism is the subject of a series of papers by V. Korenchevsky and Marjorie Carr. Dr. Lumsden's studies in the experimental treatment of implanted malignant tumours of the rat by an anti-serum suggest that such an anti-serum may come to be of special value in man, when administered in conjunction with surgical removal of malignant growths. In Part II there is again a large series of papers dealing with nutritional problems, vitamins, metabolism, and the action of ultra-violet light on food-stuffs. Notable contributors to the volume are Dr. Harriette Chick, Dr. Margaret Boas,—who deals with the anti-rachitic value of winter spinach; and Dr. Margaret Roscoe, who in a joint paper with Dr. Chick,

deals with the influence of diet and sunlight on the amount of vitamins A and D in the milk of a cow; it was found that the richest content of both vitamins occurred when the cow was out at pasture in the summer. H. D. Kay deals with the variation in the end products of bacterial fermentation, resulting from increased combined oxygen in the substrate; and Ida S. Maclean and Dorothy Hoffer on the carbohydrate and fat metabolism of yeast.

The annual collected papers of the Lister Institute should be in the library of every large medical research institute in India. The Lister Institute has always been foremost in its studies of metabolism, nutritional problems, and vitamin studies; and the three volumes for 1923-26 show what an enormous amount of valuable investigation is being carried out at the Institute in many fields of work.

R. K.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. COLLECTED ADDRESSES AND LABORATORY STUDIES. VOL. II; FOR THE YEAR 1925-26.—Compiled by Prof. R. T. Lelper.

We very much regret the delay in reviewing this sumptuous and most valuable volume. Like the Lister Institute for Preventive Medicine, the London School of Hygiene and Tropical Medicine follows the admirable custom of annually binding together in one volume reprints of the publications during the year by members of its staff, for distribution to other medical research institutions and schools of tropical medicine all over the world. We presume that this volume is for private circulation only, and not for sale; but there must be many old students of the London School in India who will be interested to know of it. The volume includes three addresses by Dr. Andrew Balfour, and reprints of 32 papers by the members of the staff.

Dr. Andrew Balfour's addresses are always fascinating reading, for they are based on a knowledge, a wide experience, a charming literary style, and an earnestness of purpose which it would be hard to match. "Why Hygiene Pays"—an address to the delegates attending the West Indian Conference held in London in May 1925, has already been reviewed in our columns. It is a very striking and forceful essay, and one which will provide much powder and shot for the public health propagandist. "Some British and American Pioneers in tropical medicine and hygiene"—Dr. Balfour's presidential address to the Royal Society of Tropical Medicine and Hygiene—is an outstanding contribution to the literature of both medical history and tropical medicine. India may study this address, with its wonderful gallery of portraits, with much advantage and with no little pride, for workers in India are prominent amongst the pioneers mentioned in it. Further, the address is in Dr. Balfour's most delightful and pleasant literary style. The third address is a brief one on "Some landmarks in tropical medicine," given to the Cambridge University Medical Society.

Turning to the laboratory studies, we have here such a wealth of valuable material that it is impossible within a short space to give any adequate account of it. Several of these papers, however, have been previously reviewed in our columns. The short paper by Dr. P. A. Buxton and Mr. G. H. E. Hopkins on "Race suicide in *Stegomyia*" is an account of a search for a fluid which should prove so attractive to the female *Stegomyia* that she will lay her eggs on it in preference to any other site; once the eggs are laid they can then be destroyed at regular intervals. It is precisely by such biological and bionomic studies that the cause of anti-mosquito campaigns is likely to be most advanced. We want a thorough study of the habits of mosquitoes; of their natural enemies—whether protozoal, helminthic, or in the insect world; of the factors which affect their breeding grounds, both with regard to selection of sites and development of

the larvæ. This field is a pioneer one, only the fringes of which have been explored as yet; but it is one of great promise, and Dr. Buxton, Dr. Williamson of Singapore, and Mr. Senior-White of the Central Malaria Bureau at Delhi are amongst others who have made important contributions to our knowledge in the matter.

Dr. E. Hindle and Dr. J. T. Duncan conclude that when bacteria are ingested by *Argas persicus*, they remain confined to its intestinal tract and are gradually eliminated through the faeces; this tick is therefore not a likely transmitter of bacterial infections. Drs. J. C. Thomson and A. Robertson contribute a series of papers of protozoological interest and importance; they have cultivated both the intestinal entamæbæ and flagellate protozoa of man by the technique of Boeck and Drbohlav; have studied the natural herpetomonads and crithidias of anopheline and culicine mosquitoes; have demonstrated that the coccidia of the genus *Eimeria* in human faeces are natural parasites of fish, have nothing to do with man, and are only ingested by him, when they may be found in the faeces of a patient on a fish diet; whilst Drs. J. G. Thomson and C. L. T. Lucas describe the common entamæba of the cockroach—a paper illustrated with useful and original plates, and discuss the status of the genus *Entamæba*. Major H. C. Brown, i.m.s. (ret'd.), and Drs. H. C. Duncan and T. A. Henry discuss the differentiation of food-poisoning bacteria, giving a useful table of differential cultural reactions. Miss M. J. Triffitt describes entamæbæ found in African antelopes and water buck—a paper illustrated by a very good plate; also protozoal parasites allied to the genera *Lymphocystis* and *Eimeria* found in the intestinal wall of Bennett's wallaby—a paper with a useful bibliography.

A paper of special interest is one by Dr. P. A. Buxton on the depopulation of the New Hebrides and other parts of Melanesia. He considers that, whilst tribal wars, septic midwifery, and the practice of abortion and other customs may have seriously contributed to depopulation in the past, the factors which are mostly at work at present are different. It is association with European civilisation that is largely responsible; whilst the Government is a Condominium, which moves at snail's pace, so that administration is uncertain and slow, whilst free medical treatment has not yet been provided. Alcohol is a big factor, also the destruction of communal life and interests by missionary proselytisation. Of the endemic diseases malaria and yaws are important because they render the race unhealthy and liable to succumb to imported epidemics, of which dysentery and pulmonary tuberculosis are the two most important. The race continues to decline, whilst there is a great excess of male births over female (118 to 100). The extinction of the race would appear to be only a matter of time, unless vigorous measures are taken.

Dr. H. B. Newham contributes a report on the chemical analysis of the stools in spruce, and Dr. J. G. Thomson a good—but all too brief—paper on pseudo-parasites in the faeces of man. (This subject very badly wants working up in the interests of protozoologists and helminthologists alike). Dr. J. T. Duncan has investigated the bactericidal principle present in the alimentary tract of flies, mosquitoes, and ticks; the action of this principle is more like that of an antiseptic than of the bacteriophage, and it is possibly of the nature of an intestinal secretion. The presence of such an agent might play an important part in rendering the gut of such insects sterile and therefore suitable for the transmission of certain blood-inhabiting protozoa.

There is a wealth of helminthological papers in the volume. Professor Leiper deals with Dr. Sambon's claims that the *Gongylonema* worm may have something to do with the causation of gastric carcinoma in man, and concludes that all the evidence available is against such a hypothesis. Dr. H. B. Newham deals with *Clonorchis* infection of the pancreas; Dr. T.

Goodey with a nematode causing galls on the roots of barley; with an *Ascaris* from the sheep; a nematode found in diseased potato tubers; and the genus *Strongyloides*. Dr. R. J. Ortlepp describes nematode parasites from the gizzard of the peafowl, and reviews the genus *Streptopharagus*. Dr. T. W. M. Cameron deals with the genus *Echinococcus*, describes a new species of *Trichostrongyloid* worm from Bennett's wallaby, and discusses the lungworms.

The whole volume is full of interesting matter, and well emphasises how vigorous and active the London School is in its new and extended functions. It is one which will appeal especially to the parasitologist and the laboratory worker, whilst the public health officer in the tropics will find much of interest in it, especially in Dr. Balfour's addresses. It is well bound, and of a convenient size to handle.

R. K.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. III. THE SPREAD OF DROPLET INFECTION IN SEMI-ISOLATED COMMUNITIES.
—By Surgeon-Commander Sheldon F. Dudley, R.N. Pp. 61. London, H. M. Stationery Office: Indian agents, Thacker, Spink and Co., Calcutta, and others. Price, 1s. 6d.

THAT droplet infection is a serious menace in India is shown by the terrible influenza pandemic in this country in 1917-18; by the terrible prevalence of tuberculosis due to infection with the bacillus of human type; and by the special prevalence at certain times of the year of diphtheria, infectious coryza, and other respiratory complaints. A study of the spread of such epidemics in the general population at large, however, involves the interaction of so many different factors that it is well-nigh impossible. In a limited or semi-limited community, on the other hand, the factors at work are less obscure, and the Royal Naval School at Greenwich offered such an opportunity to Surgeon-Commander Dudley. In the preface to this booklet, the Medical Research Council explain the conditions under which the enquiry came to be carried out as follows:—

The laws which govern the onset and decline of epidemics of infectious disease are still only known in small part. For the population at large, living in unrestricted inter-communication, the conditions are so complex that accurate observation is difficult and often becomes almost impossible. Much more hopeful are attempts to solve the problems, one by one, by the experimental method applied in suitable animal communities. The Council have been glad on that account to give their support to the novel and ingenious studies in experimental epidemiology initiated by Professor W. C. Topley, and recently the subject of a fruitful collaboration between him and Dr. Major Greenwood.

It has been sometimes overlooked, however, that there is another line of attack hardly less promising than the direct experimental method, where the conditions are favourable. There are some communities sufficiently isolated and under control to have much the same value for purposes of study as a group of animals under experimental conditions, and they may give at the same time some added advantages. It so happens that the Royal Navy includes several semi-isolated communities of this sort, and it is to the credit of Surgeon-Commander Dudley, R.N., that he has grasped the opportunities which they offer for the study of epidemiological problems, and for the improvement of our mastery over the spread of disease. One of the most suitable communities for the purpose is the Royal Naval School at Greenwich, and three years ago the Council published in this Special Report Series (No. 75), by permission of the Admiralty, a report by Surgeon-Commander Dudley upon his studies of the natural history of diphtheria and scarlet fever at this school which they believed to have a high value.

No less interest attaches to this second report in which the writer has carried his investigations further. He extends them to some other diseases which, like

diphtheria, are spread chiefly by droplet infection from the respiratory tract, and he compares the observations made at the Royal Naval School with similar facts gained from other semi-isolated naval communities and from the Foundling Hospital.

The conclusions emerging from these recent studies have much importance. Thus, as regards the fluctuations in herd-immunity and its relation to the introduction of new elements of population, the conclusions reached at Greenwich are strikingly similar to those reached by Professor Topley and Dr. Greenwood in their studies of communities of mice maintained under defined conditions; this confirmation of the animal results by actual observation of a human population inspires confidence in both sets of studies. Surgeon-Commander Dudley's own previously enunciated hypothesis as to "velocity of infection" is amplified and illustrated anew in the present report, as is the great importance of relative isolation in sleeping quarters, first brought out by Glover in his studies of meningococcus carriers, published in the Report in this series (No. 50) upon Cerebrospinal Fever among the Military Forces.

It can only be by the repeated collection and study of individual facts from many sides that the laws of epidemiology will ultimately be established. Much more work of the nature and quality of that set forth by Surgeon-Commander Dudley in this Report is needed, and in time will doubtless be forthcoming. Our practical need for better knowledge of this subject for the purposes of prevention is obvious indeed, and it will always be most obvious to those responsible for the proper care and management of definite communities like those, for instance, within the Fighting Services.

In summarising his conclusions, Surgeon-Commander Dudley enumerates one by one the different factors concerned in the spread of air-borne epidemic disease in a community, and draws attention to the necessity of providing adequate sleeping accommodation. He concludes, however, that the problems raised should receive much further study. He writes as follows:—

Summary.

The important conclusions reached by this study of the ecology of man and some of his dependent organisms are:

- (1) Host resistance to parasitic infection may be specific or non-specific.
- (2) Specific resistance depends on the nature and amount of previous contact with the proteins of the specific parasite.
- (3) Non-specific resistance may be an inherent property of the host's germ-plasm, or due to contact with other non-specific proteins. (Non-specific resistance is so important that it must just be mentioned, though it has not been discussed in this paper.)
- (4) Resistance to parasitic infection may be of any magnitude, duration, or variability.
- (5) The resistance of the population as a whole to the spread of disease outbreaks may be termed "herd immunity."
- (6) The ratio of the number of individuals with a resistance above a certain magnitude (immunes) to the number below this magnitude (susceptibles) may be termed the "herd immunity index."
- (7) The ease of spread of epidemics in space and time is a function of this index, combined with the density, and type of motion, of the herd.
- (8) Moreover, there is evidence that the symptom-producing power (pathogenicity) of parasites is in some way correlated with the "herd immunity index."
- (9) The periodicity of epidemics can be more easily understood if parasitic "virulence" and antigenic (or immunizing) power vary inversely as the degree of herd immunity; and there are now a number of observations consistent with such an hypothesis.

(10) A certain minimum mass of infective agent is required before a dependent organism can establish itself in its host.

(11) Less than this amount will be destroyed by the host and cause some alteration in the degree of resistance.

(12) Time spent in an infective environment therefore becomes of importance, not only as regards the number of opportunities of receiving an infective dose as a whole, but because sub-infective doses can be summed to an infective one, or destroyed, thereby altering the resistance of the host.

(13) The quantitative factors of time, mass of infective agent, and degree of host resistance make it essential to introduce three "velocities" into the study of infection.

(a) The velocity at which the infective material is received by the host.

(b) The velocity at which it is destroyed by the host.

(c) The velocity at which the host resistance alters in a positive or negative direction.

The resultant of these three is the "velocity of infection," on whose magnitude depends the final result of the reaction between the host and the dependent organism. This result may be an illness mild or severe, the establishment of tolerance (i.e., commensalism or the carrier state), or the destruction of the parasite; and in all cases there will be change in the host's defensive mechanisms, for better or worse.

(14) The distribution of infectious disease in time is a function of the rate at which the host population changes.

(15) The chief practical lesson this paper teaches is that the individuals of a community should be isolated from each other to the greatest extent possible in their sleeping quarters. Especially is this the case in those communities to which many susceptibles are frequently added.

Conclusion.

It stands to reason that if the principles enunciated in this paper are sound when applied to the spread of disease in semi-isolated communities, they must also be applicable to the world at large; but they are not so evident in the world at large owing to the infinite number of complex and overlapping environments. The rate of change in the world as a whole is a function of the birth and death rates and average expectation of life. The new-born babies are the recruits to the population, and hence the overwhelming morbidity of infectious disease among children as compared with adults. The new-born babe seems to possess a remarkable immunity to certain infections, which is often casually explained as being due to its protected environment. As a matter of fact the opportunities which a new-born babe has of receiving doses of any bacteria that may be in the environment are considerable. A baby is fondled and caressed by all its immediate fellow mammals, and it really is remarkable that infantile mortality should be as low as it is. But during the struggle for existence and the elimination of the unfit, a mechanism has arisen whereby new-born mammals are adapted to combat the different types of bacterial environments they may be born into. In the way previously described a mother acquires a certain degree of resistance to those bacteria she has been in contact with, and this resistance is to some degree passed over via the placenta to her foetus. In the case of diphtheria a woman who has a Schick-negative reaction, that is who has diphtheria antitoxin circulating in her blood, always bears children with a negative reaction. This immunity is subsequently lost, hence it is semi-passive in character.

There are many observations which show that this congenital and often transient immunity is not confined to diphtheria and scarlet fever. A very good example is that of undulant fever. Undulant fever is rarely reported in Maltese infants. Yet 50 per 10,000 is the

notified annual attack rate among the Maltese population, and the real incidence is probably much greater. At the present time 10 per cent. of the goats are reservoirs of *Brucella melitensis*, and agglutination tests and other evidence suggest that many human beings may also be carriers. Thus, though nearly every Maltese infant feeds to a great extent on cultures of *B. melitensis* in goat's or human milk, few show any symptoms of undulant fever. It is just possible some babies may be overwhelmed by massive infection without any symptoms of undulant fever, because the infantile mortality in Malta is so great (280 in 1923), but the writer has not heard of any work attempting to connect this colossal loss of life, with undulant fever. The same apparent immunity of British infants to tubercle bacilli is also remarkable, as at least 10 per cent. of samples of market cow's milk contain *B. tuberculosis*. Therefore the new-born infant acquires a congenital semi-passive immunity which enables it, when necessary, to acquire considerable active immunity before it is overwhelmed by the bacterial environment. In brief, the world's recruits join with a ready-made herd immunity adapted to the place they arrive in.

According to the conclusions reached from this study of the spread of infection in semi-isolated communities, the kind of motion among the human species in the world as a whole has a great bearing on the spread and character of infectious disease in general. Of late years the extent and rate of intermigration has been increasing. It might be thought that this increase in movement would be accompanied by increased morbidity of infectious disease. Possibly in the aggregate this is the case. Certainly, if the motion of the human species is suddenly greatly increased and amplified, the change is correlated with increased symptomatic infection. The epidemics during and after the Great War demonstrated this fact. But, on the other hand, if the rate of the local changes in population or the type of human motion is of a suitable quality, a compensating effect may take place. Bacterial antigens get distributed by the intermigration and produce a rise in the world's herd immunity. Sufficient intermigration should prevent the repetition of those catastrophes which sometimes occur in "unsalted" populations, such as the measles epidemic in the Fiji Islands. In some conditions, such as scarlet fever, where fatality is definitely on the wane while morbidity is increasing, both the malignant and beneficial effect of intermigration are perchance seen at work together. However, the difficulty of interpreting correctly the meaning of infectious phenomena is great enough in small communities, where some at least of the conditions are more or less controlled; but this difficulty becomes infinitely greater when applied to the world at large, and the writer realizes that the real significance of the facts described in this paper may often have been missed. The study of infectious disease, with its constantly changing distribution in time and space, is a problem in the physiology, ecology, and bionomics of parasites. The relations between man, his dependent organisms, and the external environment are in a constant state of flux. The numerous factors involved all react on each other, and the relative value of each factor varies with every complex of host and parasite. As Haldane has recently said of biological problems, "We are everywhere baffled by indefiniteness and complexity due to the fact that each phenomenon, whether of apparent structure or apparent activity, is relative to other phenomena."

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES, NO. 115. THE PREVENTION OF DIPHTHERIA.—By Dr. J. Graham Forbes, M.D., F.R.C.P., D.P.H., Principal Assistant Medical Officer, London County Council. Pp. 84. London, H. M. Stationery Office, 1927. Price, 2s. net.

The last century saw, in 1894, the introduction of anti-diphtheritic serum, an innovation which has reduced the case mortality in diphtheria from 30 per cent.

to 7 per cent. The present century, during recent years, has seen the introduction of the Schick test for immunity against diphtheria, and this test is now being very widely used all over the world in testing school children and others. The brochure here under review consists of an analysis of the results obtained in many different countries, with suggestions for the practical control of the disease. It was primarily written for the London County Council. In giving a prefatory sketch of the objects and results of Dr. Graham Forbes' enquiry, the Medical Research Council write as follows:—

The present Report offers a comprehensive survey of the methods of diphtheria prevention which have been practised upon a large scale for the past ten years in America and to a much less though growing extent in Great Britain. It throws clear light on the stages in the progressive application to practical life of measures founded upon a generation of effort in the laboratory. It is a valuable complement to the chapter upon the prevention of diphtheria in the monograph upon the disease which was published by the Council in 1923.

What the use of antitoxin, introduced in 1894, has done to improve the treatment of the disease, the method of detecting susceptibles by the Schick test, combined with their protection by toxoid-antitoxin immunization, is now doing for its prevention. All we know of the natural history of the disease and its attack on mankind shows the special urgency of the need for prevention in the present generation. The antitoxin treatment of the disease brought down the case mortality quickly from 30 per cent. to below 10 per cent., but since 1904 the decline, though continued, has only been from about 9 to about 7 per cent. During the whole time of the use of this life-saving method, the attack rate and the virulence of the disease have been increasing. In London, for instance, between 1904 and 1924 the attack rate per 1,000 persons living rose from 11.2 to 19.1 and the deaths from 0.99 to 1.33. The great saving of life given by the antitoxin treatment has held in check the total deaths, though we can see clearly what far greater sacrifice of life there must have been without it. Happily, the advance of knowledge by research has progressively given, during these very years of the growing strength of the disease, effective means for its preventive control. The results already gained by their aid, first by imperfect methods and later by the improved methods now available, are collected and set out in this Report.

In this country we shall owe much, as will be seen, to the pioneer work in the practical application of these preventive methods made during recent years in America. It will be noticed that in Great Britain, Scotland has been foremost in putting this new knowledge to use. It appears that, at the present time, of children under 15 in the general population and not within institutions, five times as many have been immunized in Scotland as in England and Wales together, or over forty times as many in proportion to the population. Including those in hospitals and schools, the total number of persons immunized in Scotland is more than double that of those immunized in England and Wales, or about eighteen times as many in proportion to the population.

In compiling this Report Dr. Graham Forbes has naturally focussed his attention upon the need for protecting the child population of London at the pre-school and early school ages. The results of his inquiry show unmistakably that diphtheria in London has a higher rate of incidence and of mortality than in almost any other European capital, and a higher rate of both than in any other large city in Great Britain. The large body of evidence already available leaves no doubt that the disease and its often fatal consequences may now fairly be called avoidable. The experience already gained during recent years and in so many places imposes upon every public health authority the responsibility of giving serious consideration to the

provision of means now available for protecting life, and especially young life, from the menace of a disease whose prevalence and malignancy have been increasing of late years and seem more likely to increase still further under present conditions than to diminish. At the same time it should not be overlooked that an important part of this provision is the necessity for making the facts clearly known to all parents, and for instructing them as to the means open to them for the safeguarding of their children.

The author reviews in turn the value, errors, cost, and use of the Schick test—a chapter which will be of practical interest to every public health worker in this country. He then takes up in turn the results of the application of this test as observed in London, Great Britain at large, the United States—where, of course, the test, and active immunisation against diphtheria have been very largely practised; and in other countries. In this connection we are glad to note that he includes the paper published by Fox and MacDonald in this journal (1923), dealing with the application of the test during a diphtheria epidemic in the schools in Shillong. We believe that so far this instance has been the only one of the application of the test in India; its results were to fully confirm the value of the method as applied in India. In his conclusion, the author writes as follows:—

It may be stated that the evidence which has now steadily accumulated in America and is forthcoming, on a more limited scale, from the work done in Great Britain, together with the world-wide use of these measures, appears sufficiently convincing to justify the experienced opinions of all who have devoted much study to the problem, and hold that the Schick test and immunization constitute one of the most notable advances in the sphere of preventive medicine. Furthermore, there is now very little doubt that their systematic adoption would result in a great yearly saving of child life, notably in London, where, though diphtheria has been more generally prevalent and presents a more pressing and difficult problem than in the provinces, no co-ordinated effort has been made to introduce immunization. Reduction in the incidence of the disease would also lighten very materially the burden on the ratepayers of the present heavy expenditure incurred in the existing system of notification, removal, disinfection, isolation, and hospital treatment and in the general preventive measures against the spread of infection in the homes, schools, and elsewhere.

The problem is one calling for the closest co-operation of all authorities concerned, whether Public Health, Administrative, or Educational—and particularly in London, where, for diphtheria, the attack-rate surpasses, and the mortality rate nearly so, that of any other city in Great Britain, and almost every other capital in Europe, if not the world.

Dr. Graham Forbes' report is one which should be in the hands of every medical officer of schools and public health administrator in India.

A TEXTBOOK OF MEDICINE BY AMERICAN AUTHORS.—Edited by Russell L. Cecil, A.B., M.D. London and Philadelphia: W. B. Saunders Co., Ltd., 1927. Pp. xxii plus 1500. Price, 40s. net.

In his preface to this bulky volume the editor points out that medicine has reached such a degree of specialisation that it is impossible for one man to master the entire field. The present work represents the efforts of no fewer than one hundred and thirty contributors, each a specialist in his own particular branch. This has resulted in the production of a textbook of medicine which is certainly one of the most complete we have yet seen. Practically all the latest advances in medicine, so far at least as it concerns temperate climates, are included. The section dealing with tropical diseases is not quite so exhaustive: we did not observe references to the value of plasmochin in

malaria, of organic antimony compounds such as ureastibamine in kala-azar, and of calcium and parathyroid in sprue.

It is impossible to read line by line a book of the dimensions of the volume under review, but in a general survey of the work we detected a gratifying absence of errors: we do not think however that *B. influenzae* should be described as a Gram-positive organism (p. 9).

We are confident that this book will find a place among the standard works of reference on the practice of medicine. It remains to congratulate the publishers on the tasteful get-up of the volume: considering the wealth of information supplied the price—forty shillings (roughly Rs. 26)—cannot be considered excessive.

J. M. H.

**LEAGUE OF NATIONS, HEALTH ORGANISATION.
STATISTICAL HANDBOOKS SERIES, NO. 8. THE
OFFICIAL VITAL STATISTICS OF THE FRENCH
REPUBLIC. Geneva: 1927.**

THE Health Section of the League of Nations is doing a notable service in preparing this series of handbooks describing the official vital statistics of various countries; the methods of collection, etc., and especially the various publications, where they are set forth and can be obtained.

The vital statistics of France during recent years have been the subject of considerable comment all over the world. To some the falling birth rate is a herald of coming national disaster, to others it seems part of that natural biological adjustment of vital happenings heading towards a stationary population; a desideratum which all civilised nations are tending. The area of a country, its natural resources, its agricultural fertility, and its standard of living are all factors determining what this stationary population will eventually be. In France it appears to be about 39 millions. It is therefore desirable that those interested in these very important aspects of public health should be aware of the methods by which the vital statistics of France are collected, their reliability and how and where this information may be obtained. The present volume, compiled by Prof. Major Greenwood and Major P. Granville Edge, gives this information clearly, simply and in a very interesting and readable manner.

A short description of the system of central government and of the system of local government is given first. The mayor is an important person in the commune and is nominally responsible for the collection of all information. Paris and Lyons have each a special system. Health legislation in the modern sense came with the Third Republic. The law of 1884 provided for departmental and municipal health services. The decree of 1920 established a Ministry of Health, which in 1924 became merged in the Ministry of Labour. The Director of Public Health (who is under the Minister of Labour) is an officer with wide executive powers, and is the central authority for the promulgation of Health measures and for ensuring that all regulations are enforced. To assist him he has a Superior Health Council, a consultative and advisory body. Ports and frontiers have special administrative staffs. In departments and communes the prefect and mayor are responsible for the provision, maintenance, and control of health services. Each department has a disinfection service and certain of them have laboratories for public health work. If the mortality of any commune during three consecutive years exceeds the mean mortality of the whole republic, an enquiry is instituted to determine cause and improvement. Towns over 20,000 must establish a Bureau d'Hygiene. The system is therefore comprehensive and logically conceived. Economic difficulties, however, stand in the way of a full realisation of advantages.

An interesting historical account is given of the collection of statistics. Like the Domesday Book, they

were first used in land tenure administration. Various data were thus collected but not utilised as a whole. To French savants we owe much of the development of the science of probability, and Deparcieux in 1746 contributed the first French life table. Euffon in 1767 published tables of mortality based on death registers. Terray in 1772 instructed all the clergy of Catholic persuasion to keep records of births, deaths and marriages.

In 1799 a general enumeration was ordered, but was not carried out till 1801. All such information is fully collected by various departments and sent to the Direction de la Statistique Generale. Paris itself publishes an *Annuaire Statistique de la Ville de Paris* prepared by the Municipal Statistical Bureau, and in 1922 this contained comparative tables of international mortality. It was not till 1821 that a satisfactory census was taken; from that date 5 yearly census have been done. In 1876 the individual bulletin came into use all over. These are filled in for each individual.

The *Annuaire Statistique de la France*, *Album graphique de la statistique de la France*, and the *Statistique Sanitaire de la France* are the principal publications giving information on the Census.

Registration of births and deaths has been compulsory since 1803, though previous to this a "parish" system kept by parish priests was in vogue. The mayor is now responsible for their collection. These registers are verified and since 1923 registration officials every 3 months send extracts to the Direction de la Statistique Generale de la France. Live births must be registered within 3 days. Presentation of the actual child used to be compulsory but has now been abolished.

Still-births must be registered, and a special form filled in stating the duration of gestation and whether the child breathed or not. Special statistical information is available *re* still-births in the three publications mentioned above.

Deaths since 1803 must be registered, but no time limit is specified. The Mayor is the registrar. There is no legal enactment demanding the cause of death. Under the French Penal Code a medical practitioner must not under pain of severe penalties divulge any information given him during his professional duties. The fact of death must be verified by an official who at the same time usually endeavours to determine and enter the cause of death. The abridged International list of Causes of Death is used. In the "*Annuaire*" for 1921 appears a life table based on the 1911 census. Statistical information relating to diseases is therefore faulty.

Infectious diseases are notifiable, some compulsorily so, others voluntarily. Notification is made to the Mayor. Disinfection services are available, but no mention is made of infectious hospitals. Vaccination against small-pox is compulsory during the first year of life and re-vaccination during the 11th and 21st year of life. After the war tuberculosis was a serious menace and in 1916 the law created Health and Welfare Dispensaries of which now 510 are functioning.

Veneral diseases are also the subject of a special service. There is an interesting note by M. Michel Huber on the census and on "movement of population." He explains that the census is taken for two reasons.

(1) To obtain the legal population of each commune, etc., for the application of fiscal and electoral laws, etc.

(2) To obtain the population present for demographic, economic and social studies.

Two departments therefore collaborate in census taking, the Ministry of the Interior and the Ministry of Labour. Migrational movements, both internal and external, are enumerated as far as this can be done, and are published weekly and every three months.

The handbook is an interesting compilation for which thanks are due to the League of Nations officials.

A. D. S.

DYSPEPSIA AND ITS SELF-TREATMENT.—By J. N. Ganguli, B.A., M.B. Second Edition. Benares: Bharat Dharma Press, 1926. Pp. 270. Price, Rs. 2-12-0.

THIS is the second edition of a little book, the first edition of which was reviewed in our issue for October 1924. It is written by an Indian practitioner of nearly fifty years' standing, and—as it deals especially with Indian conditions, Indian dietaries, and Indian habits, it is a book of special value to the medical practitioner in India; whilst, at the same time, the European medical practitioner in this country who has to deal with Indian patients will find in its pages much information and many suggestions of value. Further, the author's literary style is delightful; page after page is adorned with admirable quotations, and he lays under tribute Susruta, Shakespeare, St. Luke, and the Bhagavad Gita. "Our remedies oft in ourselves do lie," he quotes on his title page, and this theme is well elaborated in his book.

Briefly, the author's contention is that dyspepsia—which is an almost universal condition in India—can be cured by the patient himself (except in severe and exceptional cases, where a doctor must be called in)—if he will but adopt a systematic and orderly routine of life, diet, and exercise. And the book should be particularly welcome to Indian practitioners, since it deals especially with Indian articles and customs of diet. There is much of Ayurveda in this volume (and, from the dietetic point of view, this is to be welcomed and not deplored), and also much of "Western" medicine.

The most important chapters in the book deal with acute and chronic dyspepsias; with the daily life of the chronic dyspeptic—a chapter which is full of excellent and sound common sense; with fasting; mental and nervous treatment; the use of fruits; and exercise. "Why rice eaters become dyspeptic" is a sub-heading to which we should like to call the attention of all Bengal; it is the quality of the rice which is all-important; also, to some extent, the quantity. A Sanskrit proverb advises "Fill half the stomach with food, one fourth with drinks, and leave one fourth for the humours to move in"—not at all bad advice. Lewis Cornaro was a chronic dyspeptic at the age of 40; but thereafter resolved to cut down his allowance of food and drink to 12 ozs. and 14 ozs., respectively. He lived to the age of over 100 years, and counselled that "none should be afraid of shortening their lives by eating too little." The dyspeptic should, above all, avoid three things; "suppers kill more than doctors cure"; avoid feasts; and avoid incompatible foods—and in this last section the author has wise and experienced advice to give, based on a very long experience.

Fasting is one of the author's chief remedies for dyspepsia, and he discusses fully the value of the religious fasts imposed by different religions; no food after sunset should be the golden rule; whilst an occasional 24 to 30 hours' fast is good alike for body and soul. Auto-suggestion, he also claims, has its place in the treatment of dyspepsia, whilst hypnotic suggestion is not to be ignored. Fruit is a most suitable article of diet for the dyspeptic, but it must be carefully selected according to the time of the year, and here useful instructions with regard to Indian fruit dietaries are given.

"Pau" chewing, we note, the author does *not* condemn; he considers that the habit—in moderation, of course—is of value in stimulating salivary secretion, as a carminative and antacid, and to allay any tendency to diarrhoea and irritative dyspepsia. Probably he is right in this attitude, for the habit has become firmly ingrained in India; the soda-peppermint lozenges of the West are but a substitute for it.

Of exercise and exercises the author has much to say, walking being rightly singled out as of special value for the dyspeptic. Amongst drugs he holds *kurchi* and bael fruit rightly in high value. The concluding

chapter details a "dyspeptic's directory" from A to Z.

Dr. Ganguli's little book is one of both charm and value. Its literary style is delightful: it is the mature fruit of nearly 50 years of experience; it draws inspiration alike from the West and the East; it is full of admirable quotations. Also it is a book alike for the physician and the patient. Finally, it is especially with regard to its special application to Indian conditions that it will be welcomed by the medical profession in this country.

A POCKET GUIDE TO MEDICAL LIFE ASSURANCE.—By J. J. Cursetji, M.D., L.R.C.P., L.R.C.S., L.M. & S. Second Edition. Bombay: "Times of India" Press, 1927. Published by the Oriental Life Assurance Company. Pp. 85, with appendix.

THIS is the second edition of a little book, the first edition of which we had the pleasure of reviewing in our issue for November 1924. As no price is stated, we presume that, like the first edition, the book is intended only for a limited and semi-private circulation to those especially interested in life insurance work in India.

The author has done his work admirably. We could wish, indeed, that he would expand this small book into a larger one for general publication and sale. From first to last the book deals especially with Indian conditions, and the peculiar problems which face the medical examiner of lives in India. Thus, in the examination of Indian women for life insurance, great stress is rightly laid upon the excessive prevalence of puerperal sepsis and its sequelæ in such patients. In Indian males malaria, dysentery, and above all pulmonary tuberculosis are diseases which have to be especially enquired into. Indian proposers are often very ignorant of the life history of their parents, and special care should be taken with regard to this point.

The successive chapters of the book deal with general suggestions as to the carrying out of an examination; medical examination of the applicant; his family and personal history; his present condition, and environment—the latter a factor which may have a profound influence on the expectation of life in Indians. Full details for urine analysis and for auscultatory methods of examination of the pulse pressure are given. A very special feature of this edition is the inclusion at the end of an appendix giving an analysis of average heights, weights, chest and abdominal measurements of Indian assured lives, based on 51,186 Indian lives accepted by the Oriental Government Security Life Assurance Co., Ltd., Bombay. This deals *seriatim* with different Indian races such as Bengali Hindus, Bombay Hindus, C. P. and U. P. Hindus, Madras Hindus, Punjabi Hindus, Indian Christians, Mahomedans, and Parsis. Other useful statistical information is included, chiefly from American sources.

The author is a pioneer in his line, and a study of his book shows—as might have been anticipated—that conditions with reference to life insurance in India are widely different from those in temperate climates. The normal expectations of life at different ages, the commoner diseases, and the environments concerned are completely different in Indian and European conditions. The book is admittedly a "pocket guide," but it will be exceedingly useful to all medical examiners of Indian candidates for life insurance. We trust that it is but a prelude to a larger and more comprehensive work.

It only remains to add that the paper, printing, and illustrations are excellent—quite above the general standard of works published in India; and that the book is well indexed.

SKETCH OF THE HISTORY OF THE MAYO CLINIC AND THE MAYO FOUNDATION. From the Division of Publications. Mayo Clinic, London and Philadelphia: W. B. Saunders Co., Ltd., 1927. Pp. 185. Price, 16s. net.

THE Mayo clinic is at the present time the largest single organisation for the treatment of the sick in

any town in the world. In this little book we have an all too brief sketch of the stages by which it grew from a hospital of forty beds, staffed by the Mayo brothers and their father and with seven sisters of St. Francis as the sole nursing staff, to the present gigantic organisation of over 1,500 beds, occupying several larger hotels built and acquired for the purpose, besides the original hospital, now expanded to 523 beds. The number of patients dealt with annually is about 60,000 and over 23,000 operations are performed, a total which surely surpasses that of any other institution in the world. We are permitted a glimpse of the personality of Dr. W. W. Mayo, one of the pioneers of abdominal surgery in America, but of his two famous sons we learn little, save that the responsibility for the work in the new hospital fell on their shoulders at a time when William J. Mayo had been six years in general practice and his brother Charles H. Mayo had only graduated the previous year. Their father retired from practice about this time and the two brothers carried on at first a large general practice. Neither of them had served as hospital internes, and to use their own expression they felt "the greenest of a green crew," nevertheless, in spite of early local opposition, they made good and within three years of the opening of the hospital they were performing 200 to 300 operations annually. Their reputations were now established and in 1904, fifteen years from the opening of the hospital, they and their assistants performed over 3,000 operations. Associate surgeons, physicians, pathologists and others were added to the staff, until it now numbers 118; the hospital in spite of repeated additions was outgrown by 1907 and the policy of building or taking over hotels to meet the continued expansion was initiated. The clinic building, constructed in 1914 to provide laboratory accommodation, soon proved inadequate for the needs of a service which was increasing by 20 per cent. annually and now the town of Rochester appears to exist mainly by and for the Mayo clinic.

In 1920 the Mayo brothers transferred the whole of the property of the clinic to an association of trustees, surrendering their individual ownership entirely in order to ensure that the clinic shall be perpetuated in its present form. In 1915 the Mayo foundation, supported out of the surplus earnings of the clinic, was established to develop post-graduate medical education and research in association with the University of Minnesota.

Many interesting details of the business management of the clinic, sorting and filing of records, etc., together with complete lists of present and past members of the staff are given, for which the reader must consult the book itself, where he will find the record of a truly remarkable achievement told with becoming modesty.

W. L. H.

HERNIA AND HERNIOPLASTY.—By E. M. Cowell, D.S.O., M.D., F.R.C.S. (Eng.). London: H. K. Lewis and Co., 1927. Pp. xvi plus 128, with 72 illustrations, including 8 plates. Price, 9s. net.

This book is written with the avowed object of bringing forward a method of operating on hernias of all kinds by the method of fascial grafting introduced in 1910 by Kirschner, and tested on a large scale experimentally and clinically by Gallie and Lemesurier in 1921. The fact that even in the hands of the most skilled operators the recurrence rate for oblique inguinal hernia is 3 to 8 per cent., for femoral hernia 9 to 14 per cent., and for direct hernia 16 to 25 per cent. shows that there is still room for improvement in the technique of these operations. The author's operation for inguinal and femoral hernia consists in the reinforcement of the abdominal wall by a flap taken from the external oblique aponeurosis, secured in position by a fascial suture from the opposite side of the aponeurosis. The peritoneum at the neck of the sac is separated and excised much more widely

than usual, an important feature of the operation. The technique is somewhat difficult to grasp and the illustrations prepared from photographs of actual operations are not very helpful, but the book is one which should be read by all surgeons, as it breaks new and interesting ground. At the end are two useful appendices by Dr. Otto May on hernia in relation to the Workman's Compensation Act and to life insurance.

W. L. H.

Annual Report.

ANNUAL REPORT, GOVERNMENT GENERAL HOSPITAL, MADRAS, FOR THE YEAR 1926. BY LIEUT.-COL. E. W. C. BRADFIELD, I.M.S., SUPERINTENDENT. MADRAS, SUPERINTENDENT, GOVERNMENT PRINTING, 1927. PRICE RS. 2-12-0.

As usual, this excellent report covers a great deal of ground of professional interest. The number of both out-patients and in-patients gets steadily larger and larger each year, and it is difficult to foresee what is to be done in the way of extra accommodation. The numbers treated in 1926 were 66,154 out-patients and 11,627 in-patients. Total operations numbered 13,294, whilst 232 medical students were under training during the year. On the nursing side there were 10 trained English and Indian sisters, 101 nurses, and 63 probationers. Receipts totalled Rs. 6,84,764, of which no less than Rs. 6,47,257 came from Government grants, whilst hospital recoveries brought in Rs. 36,907. The new Glacia ice plant, recently installed, worked very satisfactorily and saved considerable expenditure. The steam laundry, however, which was installed in 1913 is now very much worn and unsatisfactory. The fire protection is also inadequate.

During the year the services of a Special Manager for the hospital were lent from the Surgeon-General's office, and the office and accounts system were thoroughly overhauled. Colonel Bradfield, however, pleads for more highly paid and more competent supervising and office staff; this is one of the greatest needs of all the big hospitals in the Presidency cities of India.

Turning to the professional side of the report, it is surprising how important is intestinal disease; it was responsible for 1,036 of 9,353 Indian cases admitted; other diseases which rank high are malaria, 684 admissions; diseases of the circulatory system, 498 admissions; and diseases of the organs of locomotion, 633 admissions.

Dr. M. L. Kamanath, Second Physician, draws attention to the prevalence of diphtheria among Indian children in the Madras Presidency. He also records a fatal case of *Bacillus pyocyaneus* septicaemia, and the following case of Hunt's syndrome.

Mr. J., Anglo-Indian male, aged about 50 years, driver, was admitted on 9th February 1926 with ulceration of the left ear and external auditory meatus and left side of neck, facial paralysis, and deafness on the same side. His history was that 15 days previously he had an attack of fever with neuralgic pain in his left ear. Two days after he noticed small vesicular eruptions over his left ear and side of neck; two days later the vesicles burst and formed painful ulcers. A week after his trouble started, he noticed that the left side of the face was paralysed and that he was also short of hearing on the same side. According to James Ramsay Hunt, the pathology is primarily an inflammation of the geniculate ganglion, producing herpetic eruption over the area of distribution of the nervous intermedius. The facial and cochlear nerves being in proximity to the nervous intermedius get involved in the inflammatory process, producing facial paralysis

and deafness. Patient was put on salicylates by mouth, and a bland dusting powder used for the ulcers. Patient got better, and was discharged at request before complete recovery. Blood Wassermann reaction was negative.

Capt. P. N. Basu, I.M.S., Third Physician, records the frequency of hysterical paraplegia and of other forms of hysterical paresis. The following fatal case of jaundice appears to have been of septic origin:—

A Case of Jaundice.—An aged woman of 55 was admitted on 4th September 1926 with intense jaundice, abdominal distension and fullness. The duration of the complaint was two years. Abdominal palpation revealed the margin of the liver 4 fingers below the costal margin. The liver was hard. The spleen was enlarged reaching 3 inches below the costal margin, hard and nodular. Bile pigment and bile acids were present in large quantities in the urine. Albumin and casts were absent. The faeces were large, frothy, with much undigested fat and microscopically there were no ova or cysts. Blood films showed microcytes, macrocytes and normoblasts. There were no parasites. There were hæmorrhages into the substance of the tongue, from the gums, and into the subcutaneous tissues. Coma and death supervened.

Post-mortem.—On autopsy pus was present in the Douglas' pouch. The liver was enlarged, 59 oz., and was softened and yellow. The margins were rounded and the convexity irregular, with bosses. Section showed translucent greyish areas. Spleen weighed 20 oz. Section showed many hæmorrhages resembling infarcts. Pulp was soft, chocolate coloured. Malpighian bodies invisible. The other organs were normal microscopically. The liver showed degeneration and commencing cirrhosis. The spleen showed the appearances of passive venous congestion.

Dr. M. R. Guruswami Mudaliyar Fourth Physician, draws attention to syphilis of the lung, of which condition he records three interesting cases.

Syphilis of the lung.—These cases are not rare and yet there are such few references to these by the profession at large. Some years ago a few cases were reported by me in the hospital report and I had hoped that others might put down their experiences. I am reporting again in the hope that more attention might be drawn to this type of case. Three cases were diagnosed as such this year in my wards.

Case 1.—K, aged 30, male, was admitted on 7th April 1926 with a history of troublesome cough and expectoration with irregular fever of about a year's duration. The patient was ill-nourished and had a fairly large spleen. Liver was not palpable. Right side of chest showed diminished movement, increased tactile fremitus, diminished resonance with high pitched broncho-vesicular breathing. Repeated examinations of the sputum showed pus cells and no tubercular bacilli. The condition was suspected to be due to syphilis as after a year's fairly active disease, if it had been tubercular, cavity formation would have been noticed. Blood was tested for Wassermann reaction and was found strongly positive. A course of N.A.B. cleared up the lung condition and the patient left the hospital on 20th June 1926 cured.

Case 2.—Was interesting inasmuch as he was admitted with high temperature, cough and some paresis of left upper extremity. He gave a history of sudden onset of rigor and fever with paresis of all the extremities about a month prior to admission. The paresis cleared up except in the left upper extremities, about a month prior to admission.

Right lung showed consolidation of the base. There was leucopenia with relative lymphocytosis. Repeated examinations of sputum showed neither tubercle bacilli nor lung tissue. Wassermann reaction was strongly positive. At the time of admission he was in a low condition with hiccough and delirium. With iodides the temperature gradually came down in about a fortnight after admission. Later on a course of N.A.B.

injections cleared up the lung condition and the cough disappeared.

Case 3.—Had a long history of irregular fever, cough and expectoration. Both lungs showed scattered patches of consolidation. Repeated examinations of sputum, and no tubercle bacilli. Wassermann strongly positive. He was started on anti-syphilitic treatment but left the hospital before treatment was completed.

He also draws attention to the use of novarsural in anasarca; its immediate diuretic effect is very marked, but the effect is not lasting. Kyrsgan was used in 8 cases of tuberculosis, three of which definitely improved. He also records the following case of pleural effusion with unusual sequelæ:—

Pleuritic effusion causing kinking of the inferior vena cava and thrombosis of the femoral veins.—P., aged 13 years, was admitted with a history of severe dyspnoea, pain in the side, enlargement of liver, and spleen of four months' duration. Physical examination revealed extensive effusion into left pleural sac, with heart displaced such an extent that the apex beat was half an inch internal to right nipple. Grocco's triangle was well marked and liver and spleen palpable and tender. Immediately after admission 64 ounces of pale straw coloured fluid was withdrawn and by next day the dyspnoea was much less but the pain was no better, specially spleen. Patient was running a temperature and gel was positive in half an hour. Within a week the second tapping was done and still the heart remained on the right side and it was suspected that probably some adhesions were holding the heart in that position and it was feared that femoral thrombosis may develop. Two days after the second tapping patient complained of acute pain in the left iliac fossa. Next day the left leg was swollen and there was tenderness along the course of the left femoral vein. Shortly after the right limb also was involved. The usual symptomatic treatment was adopted. A few days later the left pleural cavity began to fill up again and on tapping was found to contain blood-stained fluid. About this time superficial veins of the abdomen were prominent. A few days later a right-sided pleuritic effusion started, pushed the heart back towards its normal position and the swelling of the leg began to decrease, evidently due to the kink of the inferior vena cava being removed and the venous circulation being made more efficient. After the general condition was improved a good deal the right side was tapped and a pint of blood-stained fluid withdrawn. Later on both sides filled up and the patient collapsed on 3rd February 1926.

Post-mortem.—Careful search for it showed an extensive adherent thrombus extending from below the level of the lower border of the second lumbar spine downwards through the right iliac vein into the right iliac vein.

N.B.—Only the right side was dissected and the left was not opened up. The right femoral vein felt almost like a nerve. The arteries were soft in comparison.

Dr. T. Krishna Menon, Honorary Physician, uses spleen puncture freely in the diagnosis of kala-azar (a change in the former practice at the Madras General Hospital), and has seen no ill effects. He also records the following case of what was apparently black-water fever, or possibly quinine hæmolytic:—

Hæmolytic after Quinine.—K. N., aged 35, Hindu male, resident in Madras city all his life, admitted for fever, headache and vomiting. History of fever with shivering the two previous days and also of similar attacks two months ago. Temperature 104.4, no rigor, headache and pain all over the body, persistent bilious vomiting, abdomen rigid, liver tender and palpable, spleen enlarged 1 inch below costal margin, conscious, but slightly irritable. No other appreciable changes. Blood showed marked leucopenia with mononucleosis. Parasites were not seen even on repeated examination. Urine 1003, acid, clear, no albumin or sugar. Clinically diagnosed as malignant tertian of a pernicious type. Quinine hydrochlor 7½ gr. intravenously and 20 gr.

by mouth in 10 gr. doses was given. The next day conjunctiva was jaundiced, severe pain in the loins was complained of, vomiting (bilious) became incessant. Vandenberg reaction showed biphasic type. Blood examination showed no parasites. Temperature 103°F. The next day temperature came down to 99°F. Urine showed marked changes; became porter coloured with heavy deposit and showed presence of bile and albumin, deposit contained a few R. B. C.'s. Specific gr. 1,020. Quinine was not repeated. Temperature remained normal for four subsequent days. During this time he had occasional vomiting containing blood. Stomach washing showed stale blood. Calcium chloride was given intramuscularly. Adrenalin and hemoplastin were tried. Bloody vomit continued and bleeding was noticed on the gums later. Nervous symptoms grew worse, delirium set in, hiccough and suppression followed 6 days after. As the patient was removed by relatives it was not possible to follow up the case. The interesting feature here is the existence of cases showing hæmolysis after quinine in supposed blackwater fever free areas.

Lieut.-Col. E. W. C. Bradfield, I.M.S., First Surgeon, gives a very interesting table showing the extent of the surgical work done in Madras; 1,085 operations—some of them of a rather severe character—with a total mortality of only 3.94 per cent. In the treatment of burns he has found application of 2.5 per cent. solution of tannic acid and exposure to radiant heat most useful. Mercurochrome has given rather disappointing results in surgical sepsis; but it is useful for irrigation of the bladder. Deep x-ray therapy has recently been used in the treatment of mycetoma. Routine examination of all patients admitted shows that 26.9 per cent. show evidence of syphilis; 20.8 of gonorrhœa; and 9.6 per cent. of both syphilis and gonorrhœa. Since these figures refer to an unselected surgical population, they presumably reflect the incidence in the general population. The figures are decidedly on the high side.

Dr. G. V. James, M.D., C.M., Third Surgeon, records interesting cases of recovery after laparotomy for suppurating tuberculous mesenteric glands, of arthroplasty for osseous ankylosis of the right knee, and of colonic polypsis. A Hindu male patient aged 40 was admitted with a typical picture of amœbic liver abscess; but a few hours after his admission sudden and severe abdominal symptoms set in. The patient's condition was so critical that he could not be operated on till next day, when he was in a less desperate state. On opening the abdomen it was found that a huge liver abscess had burst into the general peritoneal cavity. Appropriate measures and drainage were instituted, and the patient made a most uneventful and quite unexpected recovery.

With regard to gastric and duodenal ulcers, Dr. James writes as follows:—

Gastric and Duodenal Ulcers.—During the year there were 53 operations for the above conditions. In our series also, duodenal ulcers were the most numerous. In almost all the cases posterior vertical "no-loop" anastomosis between the stomach and commencement of the jejunum was carried out. No hæmostatic clamps were used in our operations, all the bleeding points in the cut section of the stomach and jejunum were completely tied with fine catgut before the suturing of their walls was undertaken, and the short time spent on this toilet was considered worth while. The appendix was removed only in those cases where it could be easily delivered out of the upper abdominal wound or when there was any abnormality present. The deaths in our series were almost all due to the supervention of pneumonia after operation. There was no incidence of severe vomiting or hæmorrhage, in this series. Recently in our weaker patients I have been doing this operation under local infiltration anaesthesia and in these cases one special feature was the ease with which the abdominal wall could be closed in layers. There was also a great reduction in the

primary shock even after a prolonged operation, and there was no incidence of pneumonia in these cases. Out of these 53 cases, the appendix was removed in 18 cases.

Capt. T. W. Barnard continued to be Radiologist to the Hospital during the year, and his report shows how continuously this branch of the work continues to expand. The research work on the condition of the pituitary fossa and adjacent sinuses in cases of optic atrophy, in association with the work of Lieut.-Col. R. E. Wright, I.M.S., was continued during the year. The work in the radiant heat and light section was very heavy; whilst the new department for deep therapy was opened during the year.

The staff of this famous old hospital are to be congratulated on yet another year's admirable annual report.

Correspondence.

CHOREA IN INDIANS.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—I send the following notes of a case in this hospital as I believe chorea is rare in India, and especially in a patient at this advanced age.

A woman, aged 70, was admitted into the hospital here on October 5th suffering with chorea. She had typical textbook symptoms. She improved rapidly under treatment and left hospital on November 2nd. She was not then quite cured but she was so much better that she insisted on going home. She gave her age as 75, and she was certainly over 65.—Yours, etc.,

B. Z. SHAH, Major, I.M.S.

CIVIL HOSPITAL, NASIK.
19th December 1927.

THE IMPORTANCE OF MEDICO-LEGAL EVIDENCE.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—The fact that the following two cases have occurred within one month some time ago in this district shows the importance of medico-legal evidence in cases of suspected murder or homicide.

(1) Two persons started out from home together, and one of them did not return. A body was found hanging from a tree later, and was brought into the station for post-mortem examination, which I carried out. I gave it as my opinion that death was due to suicide. The relatives of the missing man, however, professed to recognise the body, to recognise a photograph and other articles found on it, and pressed for a verdict of homicide. I refused to alter my opinion, however, that death was due to suicide. Two months later the missing man turned up and the body was proved to be that of someone else.

(2) A new born baby was found dead, and post-mortem examination showed that it had been killed, death being due to violence. A midwife and certain other witnesses gave evidence against a certain girl, accusing her of having given birth to the child and having killed it. Counsel for the accused, however, insisted that she should be submitted to a medical examination, when it was found that she was four months pregnant, and therefore could not possibly have given birth to the other child.

Such instances emphasise the importance of medico-legal evidence in cases where other evidence is often entirely unreliable.—Yours, etc.,

RUDRA DUTT, L.M.S.,
Assistant Surgeon.

CIVIL HOSPITAL, MAILSI,
MULTAN DISTRICT, PUNJAB.
7th December 1927.

GASTRIC AND DUODENAL ULCER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The attention of the medical profession in Bengal has been drawn to the method of treatment of gastric and duodenal ulcers by the interesting observations of Major H. Hingston, I.M.S., "on the gastric and duodenal ulcers in Bengal" published in the October 1927 issue of the *Indian Medical Gazette*. Unfortunately we are not in a position to agree with his conclusions until more light is thrown on the subject. Major Hingston seems to think that the medical treatment of the disease is useless and "Surgery seems to be the only hope." The statistics of gastric and duodenal ulcers quoted by Major Hingston do not however show the result of the surgical operations and no mention has been made about the nature of the surgical operation performed and the after result of the cases which have been treated by surgical methods. In the absence of this information, no physician of Bengal, however, is justified in advising surgical treatment of these cases as a routine measure. In the earliest experience of gastric operations, gastro-enterostomy was frequently performed in all the hospitals of Great Britain and Ireland but when the after history of such patients was traced, the results were always indifferent or bad, sometimes lamentable. It will be interesting in this connection to quote the following observations of Sir Berkeley Moynihan in the address recently delivered at the opening of the present session of the King's College Hospital, published in the *British Medical Journal* of 8th October 1927:—

"Perhaps the most abused operation in surgery is gastro-enterostomy. That it is frequently performed when not needed—that it is performed by the clumsy imitator is certain. Many of us have had the bitter duty of undoing such anastomoses or of resecting the ulcer which has developed in consequence of them.

* * * * *

"I conceive that a duty rests upon a physician greater than he realises. When a physician for whose talents and devotion I have great respect, expressed his regret that he could not agree with my advocacy of surgical treatment for chronic incoercible duodenal ulcer because the mortality of the operations was over 10 per cent., I was constrained to say that were the mortality in my hands so high, I should abandon surgery."

There are many instances on record where patients have been operated on for this condition but have derived no permanent benefit. Surgical treatment is of course imperative in cases of perforation or perigastric abscess. Again, ulcers associated with organic pyloric obstruction or organic hour-glass contraction should be operated upon because such cases are not likely to improve under medical treatment. Similarly, surgical treatment may be advised in cases of recurrent hæmorrhage which is not controlled by strict medical treatment. But I am not yet convinced that a physician would be justified in advocating surgery as a routine measure of treatment in every case of gastric or duodenal ulcer.

Major Hingston further observes "In the *mofussil*, I came to the conclusion that the disease was very prevalent among the better classes. In private practice I have seen more of this disease than I have of any other, with the exception of tuberculosis of the lungs." This observation of Major Hingston's however is not supported by the statistics of the hospitals in the Presidency of Bengal, and I doubt whether it will be at all confirmed by other physicians of Bengal who have sufficient clinical experience of this disease.

I admit that a good many cases of gastric or duodenal ulcer with ill-defined symptoms may be overlooked by the average *mofussil* practitioners of Bengal, and that a more careful search and a closer observation of the clinical symptoms and history would undoubtedly lead to the detection of more cases, but such

wide discrepancy between the statistics of Madras and Bengal cannot be explained solely by lack of careful observation on the part of the attending physicians. It will be interesting to note in this connection, that enlarged spleen, dysenteric ulcers, and tubercular foci are very frequently met with in the post-mortem room even in cases where death had been due to other causes. If gastric and duodenal ulcer were very prevalent in Bengal, we should have met with them at least more frequently in the post-mortem rooms attached to the Medical College Hospital, Campbell Hospital, and the police morgue, Calcutta. Again, the relative infrequency of gastric and duodenal perforations and the complications due to them in the surgical wards of the hospitals of Bengal is another argument against the undue prevalence of this disease in Bengal. Not only does the Medical College Hospital of Calcutta show a comparatively lesser incidence of this disease as compared with Madras, but on referring to the statistics of the Campbell Hospital, Calcutta, where poorer patients of all classes are admitted, I find the following figures:—

	1924.	1925.	1926.
Total number of cases of gastric and duodenal ulcers admitted to the medical wards ..	8	13	17

The people of both Bengal and Madras live on rice as their staple food, but the people of Madras are used to take salt, condiments—particularly chillies—in excess, and many of them are vegetarians. Whether their diet, habits and mode of living are responsible for the greater prevalence of gastric and duodenal ulcers in that province is an interesting subject for further investigation.

Major Hingston is of opinion that the ordinary clinical examination, and more particularly the history, is the safest basis on which the diagnosis may be established, and that the complicated pathological, physical, and chemical examinations though of value are not essentially necessary for the proper diagnosis and treatment of this disease. This may be true in well marked cases of advanced type with a history of repeated hæmatemesis and melaena, but when the symptoms of the disease are not very well defined is the physician justified in establishing the diagnosis from clinical symptoms and history alone, when a great authority like Sir Berkeley Moynihan still maintains "Even to-day the diagnosis of gastric ulcer made upon clinical evidence alone is perhaps more often wrong than right." I regret I am therefore not prepared to accept the view of Major Hingston that "a surgeon who considered surgery to be the only cure for these cases would have been perfectly justified in opening the abdomen on the clinical history alone."

Lastly, regarding the efficacy of medical treatment of gastric and duodenal ulcer, I still believe that there is a fair prospect of recovery provided that the disease is diagnosed early and treated properly. A strict watch over the diet and habits of the patient however is essentially necessary for any successful medical treatment. Of course the treatment of duodenal ulcer is easier and less tedious than that of gastric ulcer. I have met with cases of undoubted recovery by medical treatment alone. I know several cases of gastric and duodenal ulcer among the medical practitioners of Calcutta, who have been apparently cured by medical treatment and are still attending to their ordinary avocations in life, not like chronic invalids.—Yours, etc.,

BINOY LALI MOJUMDER,
Teacher of Medicine and First Physician.

CAMPBELL HOSPITAL,
CALCUTTA,
8th November, 1927.

A CASE OF TRANSPOSED VISCERA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—An interesting case with transposition of the viscera is under our treatment at the Assam-Bengal

Railway Hospital, Lumding. The patient, an adult male, came complaining of fever and pain in the region of the liver. On examination of what was supposed to be an enlarged and tender liver, it was found that the tumour had a spleen-like notch palpable about two finger-breadths below the right costal margin. On further examination it was found that the heart was situated on the right side, and the liver on the left, the latter being palpable about two finger-breadths below the left costal margin.

On further search for any other abnormalities, it was found that the right radial artery crosses the wrist about an inch and a half above the normal position. No other abnormalities could be detected. Benign tertian malarial parasites were found in blood films from the patient, who is still under treatment for malaria. The patient was shown to Dr. F. C. Lees, Medical Officer, Assam-Bengal Railway, who corroborated the findings.—Yours, etc.,

B. CHATTERJEE, M.B., D.T.M. (Bengal),
Assistant Surgeon.

LUMDING, A.-B. Ry.
28th October 1927.

WHY ARE WE ONE-SIDED?

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Some time last year I addressed a query to the *Indian Medical Gazette*, asking for information

Now it makes one wonder how we came to stray so far from our original condition, and if the foregoing is correct, it would appear that the long-continued testicular predominance would account for it.

Comparing ourselves again to the lower animals we find that we differ from the mammals, not only in our one-sidedness, but also in the fact that man is the only child of Nature who has forsaken the rule of periodicity in sexual intercourse and I venture to think that in this will be found my answer.

It may be found that the remedy is in the hands of women, and that the modern "freedom for women" movement is progressing unconsciously towards that very goal.—Yours, etc.,

L. V. JANESCH, I.M.D.,
Civil Surgeon.

GONDA, U. P.
20th October, 1927.

THE MILK OF HIMALAYAN COWS. A CORRECTION.

To the Editor, "THE INDIAN MEDICAL GAZETTE."

SIR,—In my article on the "Quality of Milk of Some Special Breeds of Himalayan Cows," which was published in the *Indian Medical Gazette* for October 1927, there were certain misprints. For instance, on p. 557 the following correction should be made.

Breed.	% Total Solids			% Fat.			% Non-fatty solid.			REFERENCE.
	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	
Hariana (Lucknow)	15.15	11.69	12.25	6.29	2.94	3.4	9.42	8.44	..	McMahon. Murray's Chemistry of Dairying.
Germany, Worker-Fleischmann.	..	..	..	4.30	2.7	..	..	..	..

with regard to the one-sidedness of man, and the causes for this.

I am afraid that I must have expressed myself badly as the two readers who commented upon my query showed that they had "missed the bus."

My chief point was that of all animals, man is the only one-sided one, and that since we were made with two sides to our brains, to use only one showed an evolution that was degenerating. I suggested that there must be a cause for this and that bisymmetrical development might be regulated by an unknown centre.

My query elicited no real information. Perhaps it is of so unimportant and uninteresting a nature, as to awaken no interest in any one else. If so I must apologise for inflicting it again upon your readers, but I must confess that to me it appears of absorbing interest and I can imagine a new genus of supermen arising when man shall have learnt to use his whole body and so revert to what must be originally our normal state; we have tradition for it that we are not as Heaven originally made us—"In those days giants lived."

I have been reading whatever I could find on the subject and in a publication I recently learned that it has been established that certain internal secretions, notably the testicular, act on the left brain and the right side of the body, and that the pituitary acts on the right brain and the left side of the body. It was further stated that at about the age of 45, the testicular secretion is lessening and the pituitary begins to predominate, and that it is a common experience that at about the age of 45 a man feels less awkward when using his left hand than ever before. This seems to be more than a coincidence.

Yours, etc.,
N. K. ROY.

2, CONVENT LANE,
CALCUTTA,
26th November 1927.

Service Notes.

APPOINTMENTS AND TRANSFERS.

In pursuance of the Provisions of sub-rule (2) of rule 26 of the Council of State Electoral Rules, the Governor-General is pleased to nominate Major-General T. H. Symons, C.S.I., O.B.E., being an official, to be a Member of the said Council of State.

The Viceroy and the Governor-General has been pleased to make the following appointment on His Excellency's personal staff with effect from the date specified:—

To be Honorary Surgeon.

Colonel A. B. Fry, C.I.E., D.S.O., M.D., I.M.S., vice Major-General G. Tate, M.B., K.H.S., I.M.S., vacated. Dated 1st November 1927.

Lieutenant-Colonel J. Anderson, I.M.S., an Agency Surgeon, on return from leave, is posted as Civil Surgeon, Sibi, with effect from the 21st October 1927.

The services of Lieutenant-Colonel G. W. Maconachie, I.M.S., have been placed at the disposal of the Government of Bihar and Orissa, for employment as Officiating Inspector-General of Prisons, Bihar and Orissa,

with effect from the date on which he assumes charge of his duties.

The services of Major R. V. Morrison, M.D., I.M.S., are placed permanently at the disposal of the Government of Burma with effect from 15th July 1925.

On reversion from the cadre of Agency Surgeons under the Government of India in the Foreign and Political Department, the services of Major C. J. Stocker, M.C., I.M.S., are placed temporarily at the disposal of the Government of the Central Provinces, with effect from the 2nd November 1927.

Captain S. D. S. Greval, I.M.S., an Officer of the Medical Research Department, was attached to the Pasteur Institute, Rangoon, as a supernumerary officer from the 7th to the 14th November 1927.

The services of Captain M. T. Khandwalla, I.M.S., are placed temporarily at the disposal of the Government of Madras for employment in the Jail Department with effect from the date on which he assumes charge of his duties.

The services of Captain T. R. Khanna, I.M.S., are placed temporarily at the disposal of the Government of Madras for employment in the Jail Department with effect from the date on which he assumes charge of his duties.

The services of Captain G. H. Fraser, I.M.S., are placed at the disposal of the Government of the United Provinces with effect from the 31st March 1928.

PROMOTION.

In Army Department Notification No. 1172, dated the 24th September 1927, regarding the promotion of Colonels J. D. Graham, C.I.E., M.B., and M. MacKervie, C.I.E., M.B., F.R.C.S.E., to their present rank, for "6th September 1927" read "8th September 1927."

Lieut.-Colonel to be Colonel.

W. H. C. Forster, M.B., *vice* Colonel A. Fenton, M.B., retired. Dated 25th November 1927.

Bt.-Colonel J. N. Walker, I.M.S., *vice* Colonel K. V. Kukday, C.I.E. Dated 15th September 1927.

The promotion to his present rank of Major J. P. Huban, O.B.E., M.B.E., notified in Army Department Notification No. 1253, dated the 1st October 1926 is antedated from 23rd September 1926 to 23rd March 1926.

Captain (now Major) G. Covell, M.B., I.M.S., is granted the acting rank of Major from 10th December 1918 to 20th December 1919 whilst serving with the British Salonika Force.

Lieutenant J. F. Shepherd, M.B., I.M.S., to be Captain. 1st March 1927. (Substituted for the Notification in the Gazette of 9th September 1927.)

The following *provisional* promotion is made, subject to His Majesty's approval:—

Lieutenant to be Captain.

J. H. Clapp. Dated 15th June 1927.

RETIREMENTS.

Lieutenant-Colonel J. C. H. Leicester, C.I.E., M.D., F.R.C.S., F.R.C.P., V.H.S. Dated 29th September 1927.

Lieutenant-Colonel W. F. Harvey, C.I.E., M.B., I.M.S. 19th October 1927.

Lieutenant-Colonel T. S. Novis, F.R.C.S., V.H.S., I.M.S. Dated 21st November 1927.

Major R. W. G. Hingston, M.C., M.B., I.M.S. From 25th September 1927.

RESIGNATION.

The Governor-General is pleased to accept the resignation by the Hon'ble Major-General A. Hooton, C.I.E., of his office of Member of the Council of State.

NOTES.

LONDON MEDICAL EXHIBITION, 1927.

CENTRAL HALL, WESTMINSTER, ENGLAND,
OCTOBER 3RD TO 7TH, 1927.

Burroughs, Wellcome & Co.'s Exhibit.

IN the Burroughs, Wellcome & Co. exhibit at the London Medical Exhibition one found an impressive array of scientific products of particular interest and service to the medical practitioner.

The causative micro-organisms of such diseases as tetanus, pneumonia, leprosy, syphilis, gonorrhœa, influenza and diphtheria were shown as large, coloured transparencies, and the various medicaments used in the treatment of the diseases were displayed in association. Alternating with the two groups of micrographs there were four panels dealing with the liver, heart, uterus, and nervous system, and the appropriate medicinal agents used in the treatment of pathological conditions of these organs.

Amongst the products which attracted special attention was "Wellcome" Anti-Gas-Gangrene Serum (*B. welchii*). This product, prepared at the Wellcome Physiological Research Laboratories, has given extremely encouraging clinical results in the toxæmia associated with acute intestinal obstruction and peritonitis with ileus.

Three important products for the treatment of leprosy were shown—"Moogrol" a mixture of esters of acids of the chaulmoogric series, "Avenyl" for use in leprosy complicated with syphilis, and "Alepol" which marks another advance in leprology, presenting, as it does, a fraction (low melting point) of the total fatty acids of hydnocarpus oil. Salicin which is of great interest at the moment owing to the fact that it is found to reduce temperature in cases in which quinine, salines and other methods have failed, was presented as "Tabloid" Salicin gr. 5 and 0.25 gramme.

Along with "Ernutin," which presents the essential active principals of ergot of rye in a stable solution and a state of chemical purity, prominence was given to Ergotoxine Ethanesulphonate, a preparation also originated and issued by Burroughs, Wellcome & Co. This new salt is white, crystalline, stable and more soluble than the phosphate, and presents ergotoxine in a purer state than has hitherto been attained.

In view of the increasing importance attached to vitamin-containing products, irradiated ergosterol is of interest in that it offers a method of supplementing "Kepler" Cod-liver Oil in those cases where intensification of treatment is needed. It is prepared by the irradiation of ergosterol with ultra-violet light. Although there is not in practice any proved and well-attested substitute for cod-liver oil, this product is one which may be prescribed in addition to the oil in special cases.

"SUNIC" MEDICAL CARBONS.

THE "Sunic" Medical Carbons have been introduced to meet the demand for standard carbons with a definite zone of ultra-violet emission, and are manufactured by Messrs. Watson and Co., (Electro-Medical), Ltd., Sunic House, 43, Parker Street, Kingsway, London, W. C. 2. They are British made, and the firm claim that they are entirely reliable and are cheaper than foreign carbons. They have been exhaustively tested at the Light Ward of the New End Hospital under the direction of Professor Leonard Hill of the National Institute of Medical Research in Great Britain, and pronounced satisfactory in all respects. They are made in three grades as follows:—

Grade "A."—These are suitable for the radiation of children, where a long exposure with weak intensity of ultra-violet radiation is preferable. These carbons

are somewhat similar to those now widely used and known as "white flame" carbons.

Grade "B."—These are stronger in ultra-violet radiation, and the erythema time is therefore shorter—about 50 per cent. of grade "A." They are especially recommended for adult radiation.

Grade "C."—These are intended for cases where a powerful supply of ultra-violet rays of high penetrative power is required.

The erythema times on a normal skin at 2 ft. 6 ins. from the arc with a direct current voltage of 65–70.30 amperes are

Grade "A"	..	..	8 minutes.
Grade "B"	..	..	4 minutes.
Grade "C"	..	..	3 minutes.

Hitherto the majority of medical carbons have been of foreign manufacture, with inconstant salt content, and as a result of different exposures. The present series should give the radiologist a series of carbons with standard ultra-violet output covering all his requirements.

Having received a consignment of "Sunic" Medical Carbons of "Grade B," packed in the specially devised carton for postage, we made them over to the Radiologist to the Carmichael Hospital for Tropical Diseases, Calcutta, where there is now a recently installed and very complete radiological plant. His report is as follows:—

"I have not had the opportunity to work with the "Sunic" medical carbons long enough to form a definite opinion of them from all points of view. I can however state that I am getting richer ultra-violet radiations, and therefore my erythema dose is shorter with the "Sunic" than with the previous carbons which I have used, which saves a good deal of time. The "Sunic" carbon burns more slowly, and therefore lasts much longer."

PITUITRIN, ITS PURITY AND POTENCY.

The history of pituitrin and the discovery of its oxytocic action are largely bound up with the firm of Parke Davis and Co., who were the first to render an active extract of the pituitary gland available to the medical profession. Subsequently the drug market of the world has been flooded with numerous brands of pituitrin; some of them reliable, some unreliable. And deviations from the standard are dangerous in dealing with so potent a drug, whether they be deviations in the direction of either weakness or strength. A table recently published by Parke Davis and Co., and quoted below, gives the reported results of assays of samples of pituitrin from eleven different sources; the results are not far short of amazing; thus brand "I" showed a difference of 600 per cent. potency between two packages of the same product.

Competitor.	Assay Based on Pituitrin Standard 100 per cent.
A	80
B	50
C	65
D	50
E	125
F	75
G	65
H	50
I	60
J	20
K	20
	140
	20
	less than 5
	less than 5

Pituitrin can be sterilised by boiling without loss of potency; it possesses remarkable keeping qualities; the injection of Pituitrin is practically painless because, on account of its purity, it does not require an excess

of acid for its preservation; it is free from soluble impurities of the histamine type; the risk of anaphylactic reaction is extremely remote on account of its low protein content; and finally, in colour it is practically water white.

Extraneous matter is of course bound to be present in all such glandular extracts, but Parke Davis and Co. claim—on the basis of assay—that their pituitrin gives an amount of only 1.25 mg. of extractive matter per c.c. as against 4 to 8 mgm. for other brands, and that it has the lowest protein content of any pituitary extract in the market. Also that it can be sterilised by boiling; that it keeps well; that it is free from impurities of the histamine type, which might bring about shock; and that its injection is practically painless, as it does not require an excess of acid for its preservation.

The firm of Parke Davis and Co. have been so long especially associated with pituitary extracts that they may well claim that their product is a reliable one.

B. W. & CO'S INSULIN.

We have received the following letter from Messrs. Burroughs, Wellcome & Co., which we publish with pleasure.

To

The Editor,
The Indian Medical Gazette,
Calcutta.

Dear Sir,

In the July issue of the *Gazette* you were so kind as to print a little notice in regard to the two strengths of Wellcome Brand Insulin now available, in which notice the prices were quoted as they appeared in our memo. of the 20th April. Unfortunately, the rates were reduced some time after we had written to you and before the July issue of the *Gazette* appeared.

The rates now current in Bombay are:

Per phial of 100 units	..	Rs. 2-8.
Per phial of 200 units	..	Rs. 5.

If you can very kindly agree to permitting the notice to appear again in the next issue of the *Indian Medical Gazette*, with the reduced prices mentioned above, it will help to remove an awkward impression.

We thank you in anticipation.

Yours respectfully,

BURROUGHS, WELLCOME & CO.

21st September 1927.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE Editor, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

Annual Subscription to "The Indian Medical Gazette," Rs. 16 including postage, in India. Rs. 18 including postage, abroad.

Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

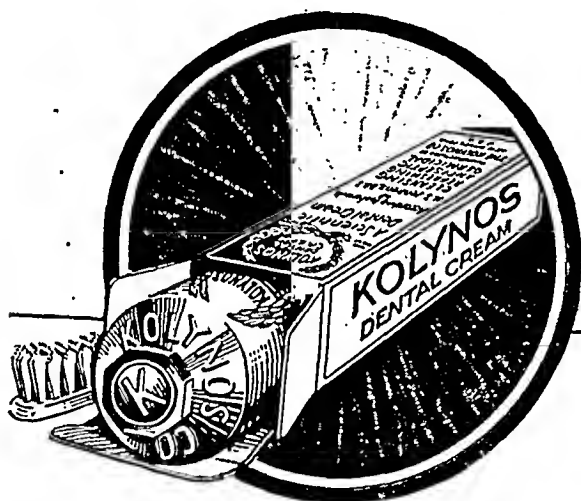
The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

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BY APPOINTMENT TO
H.R.H. THE PRINCE OF WALES

KOLYNOS DENTAL CREAM

VARIOUS devices have been offered as a means of disinfecting tooth-brushes; none, however, have enjoyed wide acceptance. Bearing directly upon this important subject is the work of W. Parker Harrison, M.R.C.S., L.R.C.P., L.D.S., who, as a result of studying the influence of dental creams upon septic conditions of the toothbrush, has found that:—

1. A dental cream is an important factor in the sanitary state of the toothbrush.
2. An antiseptic dental cream will greatly reduce the number of bacteria present.

A recent investigation in which Kolynos Dental Cream was employed gave these striking figures:—

Number of Bacteria Present on Toothbrush.			
After	5 Minutes	1 Hour	6 Hours
Brush only	2,387,000	2,184,000	330,000
Brush with Kolynos	15,000	10,000	6,400

These results clearly indicate that very few bacteria were present on the brush when used with Kolynos Dental Cream, which thoroughly cleans the oral cavity and without additional effort by the user, keeps the toothbrush in a wholesome, sanitary condition.

On request our Distributors will gladly send you a dental package, free of charge.

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a fundamentally new analeptic

without the unpleasant properties
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(subcutaneously after 5–6 minutes).

Subcutaneous application painless. No cumulative action even though given daily and hourly during protracted periods. Powerful effect on respiration. No cerebral disturbances or other undesirable phenomena. The effect of Cardiazol administered orally is more protracted than that of subcutaneous injection.

Ampoules - Tablets
Solution - Powder

For samples and further particulars apply to the Sole Agents for British India:

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Parsee Bazar Street,
Fort, BOMBAY.

Telegrama: "Rowlette," Bombay.

Original Articles.

SOME LABORATORY FINDINGS AND THEIR SIGNIFICANCE.

By J. W. D. MEGAW, C.I.E.,

Lt.-Col. I.M.S.,

Director and Professor of Tropical Medicine, Calcutta
School of Tropical Medicine

and

M. N. MULLICK, M.B.

Registrar, Carmichael Hospital for Tropical Diseases,
Calcutta.

THIS note deals with the laboratory findings in 400 unselected patients of the Hospital of the Calcutta School of Tropical Medicine and Hygiene.

The laboratory examinations were made in the research departments of the School, so that the greater part of the work which was involved is to be credited to Lt.-Col. Acton, Lt.-Col. Knowles, Major Lloyd and Dr. Sundar Rao. The analysis of the findings was made under the direction of the senior author by Dr. Mullick, the Registrar of the Hospital.

All the patients who are admitted to the beds of the hospital which are under the senior writer's charge are subjected to a number of routine examinations, irrespective of the disease from which they are supposed to be suffering.

The reasons for this practice are (a) that it is often impossible to detect the existence of certain diseases by clinical examination only, so that these diseases will often be overlooked unless every available means of diagnosis is employed: this is specially true of syphilis which often occurs, either alone or with some other disease, in a latent form, so that neither history nor physical signs may give the slightest clue to its presence. It is well known that the patient in the tropics seldom suffers from only one disease; usually there are two or more co-existing diseases each of which has to be treated, if restoration to health is to be brought about. Some people regard these routine examinations as being unnecessary; they think that those who fall back on them must be devoid of diagnostic acumen: if this be true a frank confession of lack of skill must be made by the senior writer, for there has seldom been a patient under his charge in whose case help has not been obtained from the laboratory examinations. This help may be positive or negative; in either case it conduces to accuracy of diagnosis.

(b) An equally important reason for routine examinations is that we cannot form a true estimate of the significance of laboratory findings unless we have controls. When examinations are made only in patients who are suspected to have a disease we remain ignorant of the normal standards; serious errors have arisen in this

way, for example kala-azar at various times was believed to be malaria, hookworm disease, and even undulant fever, merely because of the absence of controls in connection with the laboratory findings. This note represents a preliminary attempt to discover the degree of weight which is to be attached to certain laboratory reports.

The examinations have been made under favourable conditions in laboratories under the charge of experts, but they were carried out in a routine manner and may be regarded as representative of what occurs in every-day practice.

Unfortunately it is impossible to carry out a complete series of laboratory examinations in each patient who is dealt with in hospital or private practice, but for this very reason it is all the more important that medical men should know the likelihood of occurrence of the important diseases in latent form and also the degree of weight which they can attach to laboratory findings when they are made.

It is probably true that laboratory reports mislead the practitioner nearly as often as they help him: this is not the fault of the reports, but of their interpretation, and it is necessary to lay great emphasis on the importance of a full consultation between the laboratory expert and the physician.

The Significance of Agglutination Reactions Against Flexner Bacilli.

In Calcutta and many places in Bengal, dysentery rarely occurs as a severe fatal disease. In this hospital comparatively few cases of acute dysentery were treated, and in an investigation of the bowel diseases of the Asansol Mining area Capt. Maitra, I.M.S., of this School found that dysentery was not an important factor in causing death or loss of efficiency among the mining population.

On the other hand dysentery may be an exceedingly severe disease in times of famine or war, among pilgrims who are subjected to great hardship, and occasionally in jails, as for example among the Moplah prisoners in Alipuram jail, Bellary, as reported by V. J. Lopez in the *Indian Medical Gazette*, December 1926, p. 590.

It has come to us as a surprise that dysentery under normal conditions in India is so mild a disease: we all know how terribly fatal it can be when people are crowded together under insanitary conditions; especially when the persons concerned are of low vitality and unsuitably fed.

Flexner Agglutination Tests.

In estimating the significance of these results it must be remembered that while mild bacillary dysentery is common in Calcutta the severe forms of the disease are rare. The *Entamoeba histolytica* was rarely found as a complicating factor, cases in which it occurred have been excluded from the series.

(1) The higher proportion of positives among those who have had recent dysentery as

Analysis of Agglutination Response to the Flexner Bacillus in 400 Patients.

Titre.	Total number.	Actual signs of dysentery.	No dysentery, but history of dysentery within previous three months.	Dysentery more than three months ago.	No history of dysentery.	Flexner bacilli isolated.
+ $\frac{1}{160}$	50	13 (26%)	2 (4%)	15 (30%)	20 (40%)	2 (a)
+ $\frac{1}{20}$ to + $\frac{1}{80}$	153	22 (14.4%)	8 (5.2%)	38 (24.8%)	85 (55.5%)	2 (b)
Negative ..	197	17 (8.7%)	3 (1.5%)	22 (11.1%)	155 (78.7%)	2 (c)

(a) Both of these were suffering from dysentery.

(b) One of these had dysentery; the other gave no history of dysentery or diarrhoea and showed no signs of diarrhoea or dysentery.

(c) One had dysentery; the other gave no history of dysentery or diarrhoea, and showed no signs of bowel disorder.

Agglutination against Shiga Bacillus in 400 unselected patients.

Titre.	Total number.	Actual signs of dysentery present.	No dysentery, but history of dysentery within previous three months.	Dysentery more than three months ago.	No history of dysentery.	Shiga bacilli isolated.
+ $\frac{1}{160}$	1	0	0	1	0	0
+ $\frac{1}{20}$ to + $\frac{1}{80}$	66	10 (15.1%)	5 (7.5%)	18 (27.2%)	33 (a) (50%)	0

(a) 11 gave a history of diarrhoea.

compared with those who are not aware that they have suffered from the disease suggests rather strongly that a positive reaction is evidence in favour of the previous occurrence of an infection by one of the bacilli of dysentery; if diarrhoea be included among the manifestations of the activity of the bacilli of dysentery the case becomes even stronger; and it is reasonable to assume from the findings (a) that infection with the bacilli of dysentery is very common and widespread in Calcutta; (b) that this seldom gives rise to severe dysentery; (c) that some degree of immunity due to previous invasions is common; and (d) that the Flexner type of organism is the prevailing one.

(2) A positive finding, especially in low dilutions, is so common that it cannot be accepted as weighty evidence that an existing attack of dysentery is due to the bacillus which is agglutinated. A series of tests showing the variation in the agglutinin curve would probably be of value in acute cases, but such cases are not included in the series.

(3) A negative finding does not exclude the existence of infection. Among the negatives there were two cases in which Flexner bacilli were isolated from the stools; one of these gave no history of dysentery.

(4) Six carriers of bacillary dysentery were found by the routine examination among 400 unselected cases, and it is very likely that a larger number would have been found if repeated examinations of perfectly fresh stools had been made.

(5) Agglutination tests cannot be relied on for the discovery of carriers of the bacilli of dysentery.

Agglutinins Against the Shiga Bacillus.

(1) This type of organism was not isolated from any of the 400 stools examined in a routine manner.

(2) The absence of carriers and the rarity of high titre agglutination suggest that Shiga bacilli are uncommon in Calcutta, or alternatively that agglutinins disappear rapidly and that carriers of Shiga infection are rare in this part of India.

The Widal Reaction.

It is to be noted that single routine tests only are dealt with. It is certain that repeated tests made in accordance with the Dreyer technique would have given far more information, but as the usual procedure among practitioners is to have one or two tests made it was considered

Widal Response in 400 Unselected Cases. (1) Typhoid.

Titre.	Number.	Typhoid diagnosed on clinical grounds.	History of typhoid during the past year.		History of typhoid more than a year ago.		No history of typhoid or inoculation.
			Definite.	Doubtful.	Definite.	Doubtful.	
$\pm \frac{1}{160}$ to $+$ $\frac{1}{160}$	66 (16.5%)	11 (16.6%)	2 (3%)	24 (36.3%)	6 (9.2%)	5 (7.6%)	18 (27.3%)
$\pm \frac{1}{20}$ to $+$ $\frac{1}{80}$	110 (27.5%)	3 (2.7%)	2 (1.8%)	32 (29.1%)	10 (9.1%)	12 (10.9%)	51 (46.4%)
Negative ..	224 (56%)	1	1	0	13	0	209

(2) Para-typhoid A.

(3) Para-typhoid B.

$+$ $\frac{1}{80}$	1	16
$+$ $\frac{1}{40}$	5	5
$+$ $\frac{1}{20}$	6	15
Negative ..	388	364

advisable to analyse the results of a single routine test, which was made soon after the admission of the patient. The following points may be noted:—

(1) The outstanding feature of this series is that positive Widal reactions in fairly high dilutions are so common in persons who are not suffering from the disease that they are of little value as evidence of the existence of the disease, even in persons who have never been inoculated. This statement has special reference to persons who have lived in Bengal; it may not be true of people living in Europe.

(2) The findings are very suggestive of the existence of widespread infection of the population in childhood, and also of the existence of a considerable degree of immunity resulting from these attacks.

(3) The fact that typhoid bacilli have not been isolated from any of the 400 stools is not strongly stressed; it is not claimed that there are no carriers among the 400 persons who were dealt with; a much more elaborate investigation would be needed before this position could be taken up.

(4) The frequency of vague histories of previous attacks of continued fever among the positives as compared with the negatives suggests that many of these attacks were really typhoid fever which was not recognized.

The question of typhoid infection in childhood in India needs further study. There is rather strong presumptive evidence that most of the

children in the large centres of population suffer at some time from typhoid fever.

The para-typhoid groups do not call for much comment: in most cases the agglutinins were associated with agglutinins against typhoid bacilli.

Cysts of *Entamæba histolytica* in 100 Unselected Cases.

	Actual dysentery.	Dysentery within previous three months.	Dysentery more than three months ago.	History of diarrhoea.	No history of diarrhoea or dysentery.
Positive 7 (7%) ..	1	1	3	1	1
Negative 93 (93%) ..	..	..	..	..	..

Entamæba histolytica Infections.

It is remarkable that vegetative forms were not found in any of 100 unselected patients, and cysts only in 7. Doubtless repeated and prolonged examinations would give very different results but it is clear that amœbic dysentery does not loom large among the unselected population of Calcutta.

Out of the 7 patients who harboured cysts, 5 gave a history of previous dysentery and one of diarrhoea.

Wassermann Reactions in 400 Unselected Patients.

Of these 90 were kala-azar patients.

Strongly positive	25	6.25%
Moderately positive	76	19%
Doubtful	34	8.5%
Negative	265	66.25%

Wassermann Reactions in 310 Non-kala-azar and 90 Kala-azar Patients.

	(a) 310 non kala-azar patients.	(b) 90 with kala-azar.
Strongly positive ..	19 (6.1%)	6 (6.7%)
Moderately positive	51 (16.4%)	25 (27.7%)
Doubtful	27 (8.7%)	15 (16.6%)
Negative ..	213 (68.7%)	44 (48.9%)
	310 (100%)	90 (100%)

The Wassermann test has been found to be less misleading than any of the other tests which have been applied; it has also been more helpful in clearing up the real nature of obscure disease conditions.

The patients in whom a positive reaction was found were not admitted for syphilis and in most cases their symptoms were due to some other disease, but it has repeatedly happened that a restoration to health was not brought about by treatment of the disease for which the patient was treated until a course of anti-syphilitic treatment was carried out.

There was one dramatic case in which the patient suffered from cerebro-spinal meningitis; the diplococcus was found by lumbar puncture and treatment with Flexner's serum gave good results up to a certain point. After a few days the patient sank into a condition of coma and it was obvious that recovery could not be hoped for. At this stage the patient came under my care and a routine series of tests was carried out; the Wassermann reaction was reported to be strongly positive. Neosalvarsan was injected with results which were little short of miraculous, and in a few days the patient was walking about the ward.

Other cases could be recorded in which the Wassermann test supplied the clue to riddles which would otherwise have been insoluble, and the results of treatment left no room for doubt as to the correctness of the solution.

The time will come when a Wassermann test will be regarded as an essential routine method of diagnosis, and it is to be hoped that a simple

and reliable test will soon be available to the clinician.

The high proportion of positive findings in cases of kala-azar is capable of two interpretations:

(1) that the blood changes in the disease accentuate the serological conditions which are responsible for the positive Wassermann findings, or (2) that the presence of the syphilitic virus predisposes to the occurrence of kala-azar.

There are grounds for believing that lowered resistance is an important factor in predisposing to kala-azar, and it is quite possible that syphilis may be one of the causes of the lowering of resistance to the disease.

Microfilaria bancrofti Infection in 400 Unselected Cases.

	No evidence of filarial disease.	Doubtful evidence of filarial disease. (a)	Lymphangitis, probably filarial.
Positive 27 (6.75%) ..	18 (66.7%)	6 (22.2%)	3 (11.1%)
Negative 373 (93.25%)	..	..	..

(a) History of periodical attacks of fever with shivering.

Microfilaria bancrofti infection in 87 cases of lymphangitis believed to be filarial.

Positive ..	11 (12.6%)
Negative ..	76 (87.3%)

*Microfilaria bancrofti in 7 cases of chyluria.**

Positive ..	7 (100%)
Negative ..	0 (0%)

* These figures were kindly supplied by Dr. Sundar Rao, the Darbhanga Research Scholar in Filariasis.

Microfilarial Infection.

Among 400 unselected patients, mostly from Calcutta, microfilaria were found in 27. Of these 23 were residents of Calcutta, one of Allahabad, one of Nadia District, one of the 24-Parganas, and one of Midnapore. Only nine of these gave any evidence which might be construed as pointing to the existence of symptoms of filariasis; two had suffered from lymphangitis, and seven from occasional attacks of fever with rigors which might or might not be associated with the filarial invasion; none of the seven showed evidence of the existence of any disease which could be attributed with certainty to filarial infestation.

These facts are not brought forward as evidence that there is no association between filarial infestation and the various forms of "filariasis." We believe that such association exists, though it is not necessarily direct, but is more probably the result of a secondary infection which would not have caused disease manifestations but for the presence of the filarial parasite,

What must be emphasized is (1) that the finding of microfilariae cannot in itself be regarded as evidence that disease symptoms which occur are caused by the filariæ.

(2) Equally the failure to find microfilariae in the blood is not evidence that symptoms are not associated with filarial invasion.

In the patients admitted for lymphangitis, presumably of filarial origin, the microfilariae are usually absent.

General Observations.

Detailed analyses have not been made in connection with such routine examinations as those for hookworm and other ova, malarial parasites, aldehyde tests, etc., as these can best be dealt with by the specialists concerned.

Hookworm ova are found in about 27.6 per cent. of unselected cases in Calcutta, but it is only in a small proportion of the positives that the infection appears to be important.

Malarial parasites are frequently absent or missed in cases of malaria, and the clinician who always refuses to give quinine until parasites are found does not act in the best interests of his patients.

Blood cultures have been made in all doubtful cases of fever, but the positive findings have been so few that analysis is hardly worth while.

Total and differential leucocyte counts are also made as a matter of routine and are of great value in diagnosis, but there is little to add to the work of Sir Leonard Rogers and others on this subject. Stress may again be laid on the frequency with which a moderate leucocytosis without great increase in the polymorphonuclears is the only clue to the existence of amœbiasis. Several patients have had an unexplained intermittent fever with no symptoms suggestive of liver trouble; no evidence of *E. histolytica* infection could be found and the cause of the fever could only be discovered by carrying out the "emetine test." In one of these cases the leucocyte count was hardly above the normal limit, but the response to emetine was so prompt as to leave little room for doubt as to the nature of the disease.

The aldehyde test is of special value in cases of unexplained chronic fever with enlarged spleen, but cases are occasionally met with in which all the resources of the modern laboratory fail to discover evidence of kala-azar or malaria, which nevertheless respond to antimony or quinine.

Even in this stronghold of the laboratory experts the clinician still has his uses; in ordinary circumstances he must be encouraged to "keep his end up" while making the utmost use of his allies in the laboratory.

Conclusions.

From the results which have been summarized it is obvious that clinical laboratory tests are often useless or misleading unless they are interpreted correctly. They often indicate the

presence of a previous infection or of an existing infection which may not be the cause of the patient's illness.

If they are regarded as a final court of appeal the judgment which is based on them will often be wrong; therefore, it is necessary for the laboratory worker and the clinician to work in consultation with each other, and it will usually be necessary for the clinician to form the final judgment as to the part which is played by any infection which is revealed in the laboratory.

A positive Wassermann reaction is a call for anti-syphilitic treatment, either immediately or after the subsidence of the other disease for which the patient is being treated. When possible it is desirable that a series of routine laboratory examinations should be made in the case of every patient, as it is only in this way that a true estimate can be made of the significance of laboratory findings.

ANÆSTHESIA OF THE SPLANCHNIC AREA IN THE SURGERY OF THE UPPER ABDOMEN.

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DURING September, 1927, notes on the technique of splanchnic anæsthesia were received in the Presidency General Hospital, and it was decided that it should be given a trial.

So far this procedure has been adopted in 12 cases and the results have been so strikingly good that I consider a description of the technique for publication would be of great benefit to those who up to now are not in possession of it.

Those who practise the surgery of the upper abdomen, and have not the advantage of a skilled anæsthetist, are only too well aware of the difficulties, and annoyances, due to bad administration of a general anæsthetic, which may be met with when operating on this area of the abdomen.

The picture of a surgeon who has set out to perform a cholecystectomy, or gastro-enterostomy, and who, on opening the abdomen has to wait many minutes before he can proceed, and perhaps may even have to hold the intestines in their place with his hands, while the patient coughs, strains, and endeavours to empty the abdominal contents on to the operation sheet, is only too familiar.

Later, the operation may be hindered and delayed by the anæsthetist failing to keep the patient "under," with the result that the packed off intestines creep round the packs into the operation area.

Anæsthesia of the splanchnic area will obviate all this, and the few minutes taken in its performance before the operation proper is begun is time well spent.

Within two or three minutes of injecting the novocaine the patient is breathing without distress; there is no protrusion of the intestines into the operation area, or out of the abdomen, and the amount of general anæsthetic required is considerably lessened.

The technique is as follows:—

Two strengths of novocaine are used.

$\frac{1}{2}$ per cent. solution and 1 per cent. solution.

In the Presidency General Hospital, a 50 c.c. syringe, and a 30 c.c. syringe are employed, and in all 100 c.c. of $\frac{1}{2}$ per cent. solution are used for the first step, and 30 c.c. of the 1 per cent. solution are used for the second step.

The actual size of the syringe of course does not matter, but it is easier to work with a big one.

The patient is prepared, and the anæsthetist starts off the general anæsthetic in the usual manner.

When the surgeon is washed up, he fills the 50 c.c. syringe with the $\frac{1}{2}$ per cent. solution of novocaine, and determines the lowest point of the costal arch on one or other side.

The needle is inserted into the skin and deeper tissues till it is felt to strike the rib, and later the costal cartilage. When the rib or cartilage is felt on the point of the needle the latter is depressed and entered for a short distance under the costal arch. Some of the solution is then forced out into the tissues immediately surrounding the intercostal nerve. The needle is then withdrawn, inserted a little higher up the costal arch, and some more solution forced out, and so on until the ensiform cartilage is reached, when the opposite costal arch is similarly treated.

The abdomen is then opened by whatever incision in the upper abdomen is practised by the operator. The line of incision is not infiltrated.

The 30 c.c. syringe by this time has been filled with 1 per cent. solution of novocaine by the assistant and is held in readiness by him, or is placed close to the operator's right hand.

When the abdomen is opened, the lesser curvature of the stomach is determined and the fingers of the left hand introduced above it until the body of the 1st lumbar vertebra is felt, just above and to the right of the origin of the coeliac axis.

The index and middle fingers of the left hand are then slightly separated. This pushes the aorta further to the left, and leaves an area devoid of blood vessels on the body of the vertebra between the separated fingers. The needle is then introduced into this space and pushed home till it impinges on the body of the vertebra.

The syringe is now attached to the needle and the 30 c.c. of 1 per cent. solution is injected at a fairly slow rate. Care must be taken not to puncture a blood vessel, but if this should happen the needle must be removed and inserted in another place.

This accident has not occurred in any of the 12 cases in the series, which proves that if the

technique is correctly carried out there is not any great likelihood of injuring a vessel.

It was found in the first two cases that there was some difficulty in attaching the 30 c.c. syringe to the needle when *in situ*, as a needle of 6 or 7 inches was really required to reach from the vertebra to the surface of the abdominal wall.

This difficulty was got over by attaching 6 inches of rubber tubing to the needle before it is inserted, and at the other end firmly fixing a metal connection which fits the syringe. There is a glass window in the length of tubing, which will enable the operator to see if a vessel has been injured.

The needle is then withdrawn, and the operation proper proceeded with.

The technique is simple, its result a boon to surgeons, and no ill after-effects have been observed in these 12 cases.

On two occasions the patients breathed very slowly, and seemed as if they would stop breathing altogether, but there was no dyspnoea, and no cyanosis, and the breathing gradually came back to normal rate without any interference.

The amount of 1 per cent. novocaine was then lessened from 50 c.c. (which was used at first) to 30 c.c. and this phenomenon has not happened since.

My thanks are due to Lt.-Col. A. H. Proctor, M.D., F.R.C.S. (Edin.), I.M.S., for the elaboration of the above technique, and the starting of its practice in the Presidency General Hospital; also to Major H. G. Alexander, F.R.C.S., I.M.S., for its very clear description which he wrote out from England.

AN INTRA-ABDOMINAL OPERATION FOR OBLIQUE INGUINAL HERNIA.

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OPERATIONS devised for the radical cure of hernia are many. From the simplest one devised by Banks to the most elaborate one practised by Bassini a great deal of ingenuity has been shown by the originators of the various methods. At present there are two theories as to the cause of oblique inguinal hernia, namely the theory of Hamilton Russell and others, who think that the majority of oblique inguinal hernias descend into patent vaginal processes and that "acquired oblique inguinal hernia in the young subject has probably no existence in fact." They believe that the vast majority of all oblique inguinal hernias are due to the presence of congenital sacs. The average worked out from observations of several authorities showed that in normal children 59 per cent. had patent peritoneo-vaginal processes during the first four months and 44 per cent. even during the fifth month. Further, in children with hernia over 80 per cent. had unobliterated vaginal processes.

Others think that excepting in children such hernias in adults are caused by strain on an

abdominal wall weakened at its vulnerable points. It is certain, however, that to have a hernia, acquired or congenital, there should be a weak spot in the abdominal wall and an increase of intra-abdominal pressure. Of the many weak points on the abdominal wall the region of the inguinal canal is one. The increase of intra-abdominal pressure may be rapidly developed or may be of intermittent character or caused by a single sudden powerful strain. These are the two factors which are believed to cause all hernias, except those which are present at birth. Where the peritoneal processus vaginalis persists unobliterated, descent of the hernia is extremely easy, but where there is no pre-formed sac the increase of intra-abdominal pressure required to bring it about must be considerable and the descent is slower, gradual and occurs later in life. There are of course exceptions in both classes of cases. Even where there is no peritoneal sac, the peritoneum forms a marked dimple at the internal abdominal ring viewed from inside due to its adhesion at that point to the cord as it passes down.

The object of Bassini's operation is twofold namely, (i) removal of the sac and closing its opening at the internal abdominal ring and (ii) strengthening of the abdominal wall in the region of the canal. Those who believe in the theory of preformed sacs are quite satisfied with removing the sac and closing the neck, i.e., the opening at the internal abdominal ring; while those who think that hernias are caused by an acquired or inherited weakness of the abdominal wall, which permits a process of peritoneum to be pushed out through the canal perform Bassini's operation or some modification of it.

The causes of recurrence of hernia are (1) incomplete removal of the sac, (2) considerable and permanent weakening of the abdominal wall in old subjects, (3) suppuration, which may have been caused by faulty technique or neglect carefully to stop all hæmorrhages, which, if allowed to persist, lead to formation of hæmatoma and sepsis, and (4) post-operative vomiting or coughing which causes the ligatures to tear through the tissues.

Statistics regarding recurrence in the two types of operation show that there is nothing to choose between either form of operation.

I consider that these extra-abdominal methods of dealing with inguinal hernia, however ingenious they may be, especially those in which an attempt is made to strengthen the canal and to fix the stump left after removal of the sac, are clumsy and unreliable. It is doubtful if it is possible to strengthen the canal effectively by any method. Union between muscle and ligament must be fibrous and weak and in an individual with a very lax and weak abdominal wall and in whom the exciting cause, which is possibly an intermittent increase of intra-abdominal pressure, persists, it will surely give way. Even the effort of coughing or vomiting immediately after the

operation will tear the muscle apart from ligament or loosen the ligatures.

Further, dissection in the admittedly weak inguinal region, and mutilation of tissues caused in separating the cord from the sac and the sac from its coverings are very harmful. Thus, pain and hyperæsthesia over the cicatrix due to inclusion of nerves in ligatures, (2) atrophy of the testis due to injury to the vas, spermatic artery, or owing to pressure of a tightly sutured canal wall, (3) formation of a varicocele due also to tight suturing, (4) torsion of the testis due to twisting the gland during manipulation, (5) orchitis and epididymitis, results of rough handling of the vas or due to congestion of the pampiniform plexus, are not uncommon complications after Bassini's operation for radical cure of hernia. Besides repair of mutilated tissues by scar tissue always leaves them weaker than before.

Any attempt to obliterate the sac completely from outside must be defective because beyond the internal abdominal ring there may be and often is lax posterior parietal peritoneum ready to be forced out or descend. It is often the case that increase in size of a hernial sac however it may have originated is effected at the expense of the posterior parietal peritoneum. The chief cause of recurrence to my mind is this incomplete removal of the sac. It is impossible by any operation in which we approach the sac from without so to remove it as not to leave the so-called dimple which may at any time form the nucleus of a fresh hernia.

Fixing the neck of the sac to the anterior abdominal wall has the disadvantage of weakening the abdominal wall where the stump is fixed, and where recurrence often takes place, as the ligature strangles the muscle fibres at the site, and replaces it by fibrous tissue. Further, it does not strengthen or obliterate the loose parietal peritoneum.

It seems to me therefore that the factors in the operation, which should be depended on most to prevent recurrence, are the careful obliteration of the opening in the sac and tightening up of the loose parietal peritoneum round it, and these can be effected only by an intra-abdominal operation, which is a far more simple operation than the present extra-abdominal ones. The terrors of opening the abdomen are past. In any case, the abdominal cavity has to be entered whatever operation is performed. The method I have practised in these cases is so simple and—to my mind—so efficient that I will take the liberty of describing it now in the hope that it may find favour with some surgeons and may be given a thorough trial. In this operation not only is the inner opening completely closed without leaving a dimple, but in the process three layers of peritoneum are superimposed over the point where the opening existed leaving the canal quite unaffected and intact. Loose folds of parietal peritoneum are also tightened. There is no manipulation or separation of the delicate

constituents of the cord from the sac and therefore no damage to them. The sac itself is not handled and being serous in structure and when no longer kept open by abdominal contents is later obliterated by adhesions of its walls or atrophy or both.

Operation.—The bladder should be carefully emptied and a three to four inch paramedian incision made either on the left or on the right side according to the situation of the hernia. The skin incision is made very close to the middle line commencing from half an inch above the pubic crest and extending perpendicularly upwards. The anterior sheath is incised about a quarter of an inch from the middle line and the rectus muscle retracted outwards. The transversalis fascia, extra-peritoneal fat and peritoneum are then incised and their edges picked up together by forceps everted and retracted. A warm towel is then introduced into the abdominal cavity and the intestines kept away from the inguinal ligament and the internal abdominal ring, which is found about two inches to the outer side of the middle line. The finger may now be introduced through the internal abdominal ring into the hernial sac to demonstrate it.

Pick up with four or five forceps the peritoneum from the circumference of the ring a quarter of an inch away from its margin, being careful to avoid lifting up the cord. The circular fold of peritoneum thus lifted up is now closed by a purse-string suture of fine catgut. This suture is then covered by peritoneum picked up either by interrupted or continuous Lambert stitches from the surrounding loose parietal peritoneum. Thus not only is the opening of the sac most efficiently obliterated but the loose peritoneal folds lying immediately around it are utilized to strengthen the closure. A Lambert suture as mentioned provides a covering of two layers of peritoneum above the purse-string suture. The abdomen is now closed in layers. The operation is practically bloodless, efficient and quick. It can, however, only be done in cases of reducible hernia. The operation may be performed under novocain infiltration anæsthesia, supplemented if necessary by a few whiffs of ether.

A NOTE ON THE VALUE OF RECTAL INJECTIONS OF POTASSIUM PERMANGANATE IN THE TREATMENT OF PNEUMONIA.

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LIEUT., I.M.D.,

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IN the *British Medical Journal* for July 17th, 1926, there appeared an article by Dr. Herbert W. Nott of Little Sutton, Birkenhead, on the value of rectal injections of potassium permanganate solution in the treatment of pneumonia. His technique is slow rectal injection of a warm solution of potassium permanganate of

strength 2 grains to the pint, in quantities of from 4 ozs. to one pint, three to four times a day. He further states '...no one knows why potassium permanganate held in aqueous solution and injected into the rectum, should give such good results.'

Since reading his article, and at the suggestion of Major J. M. R. Hennessy, I.M.S., Senior Medical Officer, Port Blair, I have given this treatment a trial, and make these notes on the results obtained.

I began the treatment on the 9th September, 1926, and from that date up to March 21st, 1927, have treated twenty-two cases, with 50 per cent. of recoveries. At first sight this recovery rate may appear to be a very poor one, but it should be understood that our patients are usually very debilitated, that pneumonia among them in Port Blair is apt to prove an extremely fatal disease, and that it is only in the few patients who come to hospital at the earliest indications of disease that it runs a comparatively mild course. The majority of cases come to hospital late in the disease, and have probably carried on their work until the second or third day of illness.

The salient features observed with this line of treatment were:

- (1) The rapid disappearance of respiratory discomfort.
- (2) The early fall in temperature.
- (3) The early commencement of expectoration.
- (4) The ease with which expectoration is performed.
- (5) The improvement in appearance and well-being of the patient.

After each injection there is a drop of about one degree in the temperature for from half an hour to an hour, and it was always noted that 24 to 36 hours after starting treatment there was fairly free expectoration. The sputum had a yellowish tinge, and did not have the tenaciousness so characteristic of the sputum in lobar pneumonia.

There is also a marked controlling effect on the pyrexia, as will be seen from the temperature charts, and this good effect was seen even in cases of massive pneumonia of the lungs; e.g., Case No. 6.

In Port Blair, although pneumonia is not a very important cause of admissions to hospital, yet the cases which we get are almost always of very severe type; frequently too the patients are long standing sufferers from chronic malaria; and under these circumstances a 50 per cent. mortality represents a real reduction. It may be remarked that no case was treated solely with permanganate injections; subsidiary treatment of the usual type being also followed. The method seemed of special benefit in the case of children and in patients seen at an early stage of the disease.

Whilst I was away on leave the treatment was carried out in a few further cases and also in some of the other hospitals in Port Blair with some success. Since my return from leave I

have treated a further case of left lobar pneumonia in an elderly man of poor physique with success. In this case, in addition to the rectal injections, two intravenous injections of a 1:500 solution of potassium permanganate were given with satisfactory results.

The following are notes on some of the cases treated:—

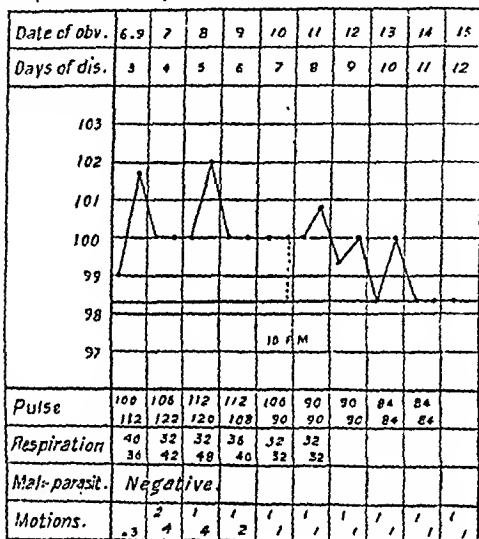
Case No. 1.—No 44987, Poka, an elderly man reported sick on 6th September, 1926. History of fever for two days with a persistent headache and pain in the chest. Spleen and liver four fingers below costal border. Differential blood count showed 7 per cent. of large mononuclears. Right apical consolidation detected

No... 44987.

Name... Poka.

Date of admission... 6-9-26. Disease... L. Pneumonia.

Hospital... Haddo port blair. Result... Cured.



both in front and behind.

Treatment.—Linseed poultices, Mist. Expect. and Mist. Quinina.

9th September, 1926.—Potassium permanganate solution gr. 2 to one pint of warm water as rectal injections was used as follows:—

Name... Mena.

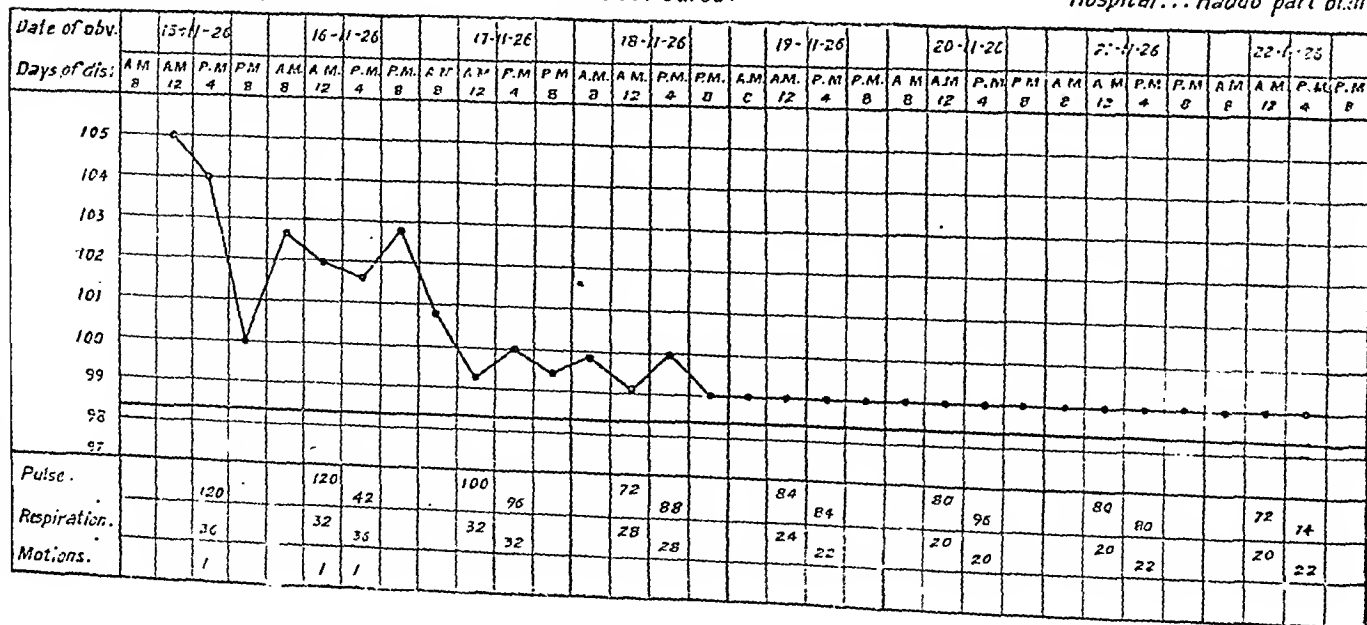
Date of admission... 16-11-26.

Disease... Pneumonia double.

Date of discharge... 8-12-26.

Result... Cured.

Hospital... Haddo port blair.



4 oz. at 10 a.m.
6 oz. at 2 p.m.
8 oz. at 6 p.m.
10 oz. at 10 p.m.

The expectorant mixture was stopped, and 10 m. of Vinum ipecac was added to the Mist. Quinina.

This routine of treatment was continued up to the 13th September, 1926, and on the 16th September, the lungs were quite clear.

Final notes on this case.—Respiratory relief was obtained early and expectoration soon became free, yellow tinged, and not of the viscid gelatinous kind common to pneumonia sputum, especially in the early stages. The expression, from one of anxiety soon changed to that of comfort; convalescence was rapid.

Case No. 2.—Makbul, aged 7 years. Admitted 10th November, 1926. History of fever, coryza and cough for 7 days. Pain in the chest, fine crepitant râles heard in both lungs scattered about, more in right than in left. Board dullness to percussion on right side. Temperature 103°F. Pulse 120. Respirations 30. Liver and spleen enlarged.

Treatment.—Linseed meal poultice to the chest and back two hourly; potassium permanganate solution gr. 2 to one pint in 10-oz. quantity per rectum four times a day.

R Vin. Ipecac m. 10.

Aqua ad oz. 1.

4 hourly.

On the morning of the 11 November, 1926, the temperature had risen to 105°F. On the 14th morning the temperature had dropped to normal, but there was a rise to 103°F. on the morning of the 15th and the liver was found to be very tender. The child was not distressed in any way. Linseed poultices were discontinued and antiphlogistine used instead, and as there was a history of previous dysentery, 1/8 grain of emetine was given.

16th November, 1926.—The change this morning is wonderful. Breathing deeper and more regular, expectoration normal, and expectoration free and profuse.

18th November, 1926.—Lungs clearing up wonderfully and the patient practically vomits up a mouthful of expectoration at a time. Temperature has been normal since last evening, Pulse 80. Respirations 22.

Nothing further to record. In all the patient had six emetine injections.

Note.—Cases 1 and 2 came from a village where a mild influenza was active.

Case No. 3.—Female. Mena. Age 35 years. Brought to hospital on 15th November, 1926. Temperature

104.8°. Pulse 120. Respirations 40. History of fever, cough and coryza for 14 days. Mild delirium. Crepitant râles at both bases. Dullness of left side marked.

Treatment.—Linseed meal poultice to chest and back 2 hourly.

R Vin. Ipecac m. xx. Permanganate solution 2
Tr. Digitalis m. x. gr. to one pint.
Aqua ad .. 1 oz. One pint rectal injection
t.d.s. 4 times a day.
Barley-water and iced milk.

16th November, 1926.—A brisk purge had to be given, and urine had to be withdrawn. Antiphlogistine to replace linseed meal poultice.

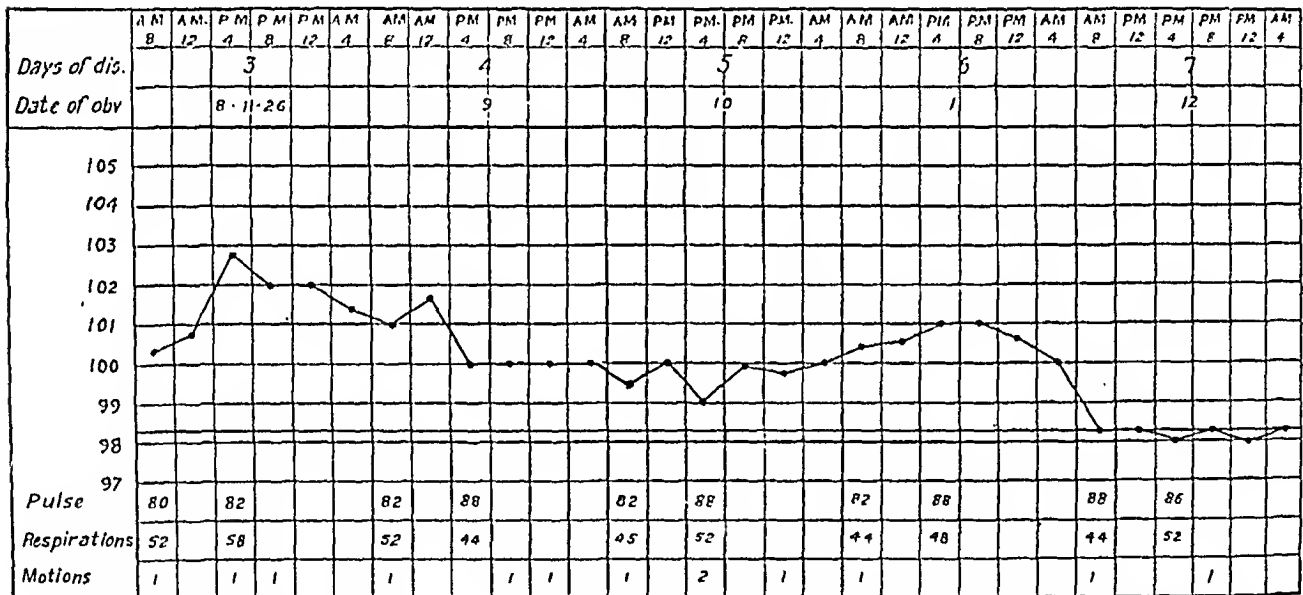
17th November, 1926.—Patient states that she feels comfortable to-day although the respirations are 40 per minute. Expectoration has started and has a yellow tinge. Temperature chart as shown.

19th November, 1926.—During the night of the 18th-19th, there was profuse expectoration. Patient is quite happy, bright and talkative. There is nothing further to record in this case, but I must mention that the patient had a very poor physique; respiratory distress was relieved within 24 hours, and the lungs cleared up very rapidly.

Case No. 4.—No. 35267. Narein Din. Admitted.

No 35267. Name... Narayan din.

Pneumonia.



On 9th November, 1926.—History of fever and cough for three days, expression anxious. Râles and rhonchi heard in both lungs. Coarse crepitations on the right side. Dullness in the right axillary region extending to below the right scapula. Spleen enlarged. Large mononuclears 8 per cent.

Patient was put on permanganate irrigations per rectum, (gr. 2 to one pint) in doses of two 8 ozs. irrigations and also two of one pint each, and a mild expectorant mixture.

11th November, 1926.—5 p.m. patient has had no sleep since admission to hospital and is much exhausted. Respirations still laboured. Pulse very good.

12th November, 1926.—Expectoration started during night of the 11th November, 1926 and patient is feeling comfortable. Treatment was continued up to the 20th November, 1926, after which patient was put on to tonics.

The special points of interest in this case are:—

First the controlling of the temperature, second the maintenance of a good pulse, and thirdly the rapidity with which the lung cleared up once expectoration started, although the respiration rate remained high.

Case No. 5.—Female. Basanti. Admitted to the

hospital on 23rd September, 1926. Her husband had died the previous week in the village from pneumonia. There was a good deal of influenza in the village at this time, and a month previously in her house there had been two deaths. Her illness was of six days' duration, and owing to the death of her husband she was suffering from a good deal of shock.

Right lower and middle lobes showed signs of consolidation. Temperature 103°F. Respirations 34. Eyes bright, expression anxious.

Treatment.—Purge. Expectorant mixture. Rectal injections of permanganate solution (gr. 2 to 0i) as follows:—

4 oz. at 6 p.m.
8 oz. at 12 Noon.
10 oz. at 4 p.m.
1 pint at 8 p.m.

Linseed meal poultice to the chest and back.

25th September, 1926.—Tincture of digitalis m. x. added to each dose of mixture, and 1 oz. of brandy to be given at bed time. In the evening after being sponged there was a nasty amount of collapse and restoratives had to be used.

26th September, 1926.—Chart shows a tendency to iysis. Expectoration has changed from viscid to a

frothy, yellow-stained sputum. Patient's condition was not favourable for trial of a new and experimental line of treatment, and so a dose of ten millions pneumococcal vaccine was given. Evening. Distinct respiratory distress, pulse bad.

27th September, 1926.—Patient surprised me this morning; expectoration suddenly during the night became free and profuse, and the patient had a good night. Respirations although fast were not of the distressing type.

Rectal injections in one pint doses ordered from to-day.

28th September, 1926.—Most satisfactory progress.

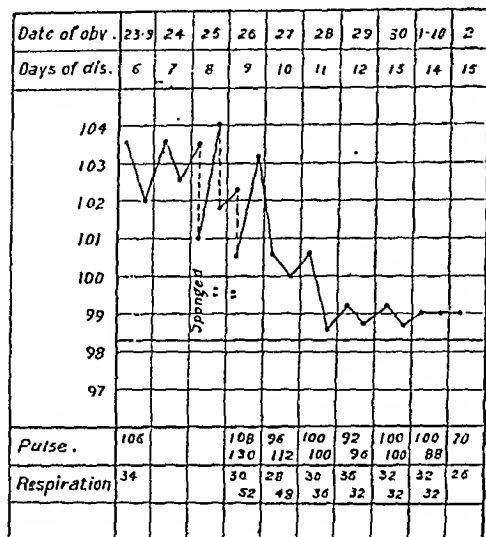
1st October, 1926.—Progress all that one would hope for (see chart). Pulse 126. Respirations 32.

There is nothing further to record about this patient, from now onwards progress was uneventful.

Case No. 6.—No. 38037, Ganga Singh, aged 38 years, admitted on the 16th November, 1926, with the history that from about 4 a.m. he took bad with fever and a dry cough. Signs of definite consolidation of the base of the left lung were present and the patient had a nasty irritating hicough. Liver and spleen both

palpable. Blood negative for malarial parasites. Temperature 102.6°F. Pulse 126. Respirations 32.

Name...Female Basant. Date of admission...23-9-26
Hospital...Haddo. Disease...L.Pneumonia.
Date of discharge...13-10-26. Result...Cured.



From friends it was definitely ascertained that he was ill for five days before coming to hospital. Post-mortem examination showed massive double pneumonia, and the point of interest from the view of treatment is the fall and control of the temperature.

Case No. 7.—Phree Narain, aged 54 years, admitted on the 29th November, 1926. Fine crepitations audible on the right side. Percussion note dull. Pleuritic rub above base. Temperature 102.6°F. Pulse 128. Respirations 40. Spleen much enlarged, liver palpable. Patient comes from a very malarial area.

Treatment:—Permanganate rectal injections in one pint doses four times daily. Expectorant mixture with m. x of digitalis tincture. Linseed meal poultices to chest and back 2 hourly.

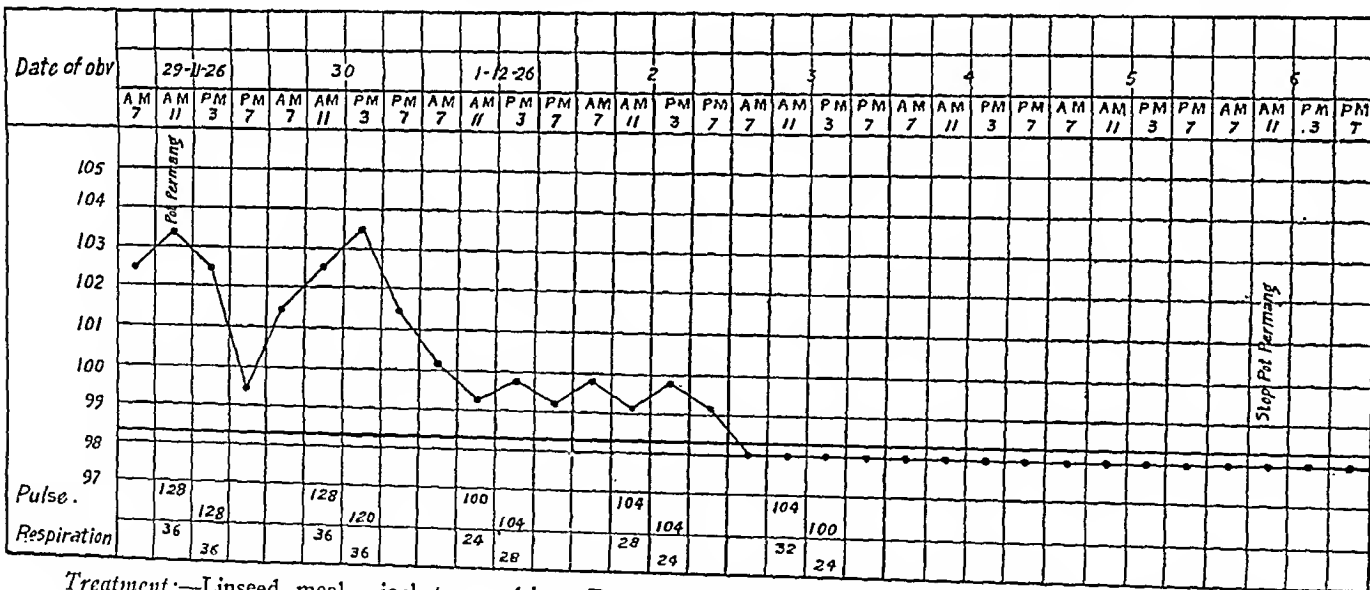
30th November, 1926.—Antiphlogistine poultice instead of linseed. Marked consolidation of right lung, middle lobe. Râles and crepitations all over. Pulse 120. Respirations 26.

1st December, 1926.—A markable change. Feels comfortable. Respirations easier. During the night yellow stained expectoration started. Potassium iodide gr. 5 added to each dose of mixture.

4th December, 1926.—Some difficulty in passing urine, and hot packs had to be applied over bladder.

6th December, 1926.—Permanganate treatment stopped. Digitalis reduced, and antiphlogistine discontinued. The points of special interest in this case are that the

Name...Narayan. Date of admission...29-11-26. Disease...L.Pneumonia.
Date of discharge...7-1-27 Result...Cured. Hospital...Haddo.



Treatment:—Linseed meal jacket poultice. Permanganate solution rectal injections:—

R

8 oz. at 7 a.m. Spt. ammon. arom. m. xv.
10 oz. at 10 a.m. Spt. aetheris m. xv.
12 oz. at 1 p.m. Tinct. digitalis m. x.
12 oz. at 4 p.m. Aqua ad .. 1 oz.
12 oz. at 7 p.m. t.d.s.

17th November, 1926. Temperature has been 100°F. since 4 p.m. on the 16th. Patient had a bad night. Morning temperature 100°F. pulse 140, respirations 48. Scanty yellow stained expectoration has begun. Both lungs are now affected.

18th November, 1926.—Pulse bad, 148. Both lungs consolidated. Marked respiratory difficulty. Hiccough and exhaustion. In spite of all that was done for him, the patient died at 4 p.m.

patient was an elderly man with a constitution undermined by malaria. Although the whole of the right lung was affected there was a remarkable control of the temperature, and once the expectoration started it was profuse, and resolution in the lung took place rapidly.

THE ANTIMONY TEST IN THE EARLY DIAGNOSIS OF KALA-AZAR.

By PASUPATI BHATTACHARYYA, D.T.M.
(Bengal),

Police Hospital, Calcutta.

THE Police Hospital, Calcutta, offers a special opportunity for the study of cases of fever with enlarged spleen, since immediately a member of

the police force reports sick he is sent to hospital and is under observation until he is discharged cured. For this reason one has been able to observe a number of cases which commenced with fever of rather acute type and progressed to fever of chronic type. Those of such cases as do not yield to quinine treatment used to present special difficulty, as one had to wait for a more or less prolonged period before one could diagnose whether the condition present was one of kala-azar or not. At such an early stage of the disease the spleen is not sufficiently enlarged for spleen puncture, whilst facilities for culture of the peripheral blood were not present. Peripheral blood cultures were sent to the Medical College Hospital for report, but they usually became septic. Hence one had to rely on clinical symptoms and on the progressive leucopænia for diagnosis, and in the meantime to institute antimony treatment pending proof that the disease present was kala-azar. The aldehyde test, though valuable, does not become positive before the third month of the disease.

Since the introduction of Major Chopra's antimony test for kala-azar this difficulty has almost been removed. Having studied the technique employed in Major Chopra's laboratory, I have since applied the test to all suspected early cases of kala-azar, and have applied it so far in 51 suspected cases, which are analysed in the table herewith. My experience is that the antimony test, although delicate, is reliable in the early phases of the disease, and therefore of much more value in such cases than the aldehyde test. Of the 51 patients tested, 20 gave a definitely positive antimony reaction, whilst in another 9 cases the reaction was doubtful in character. Two cases gave a positive reading as early as on the 15th day of fever. One case was negative on the 18th day, but positive on the 26th day. One further case was negative on the 22nd day, but was treated with antimony on account of the leucopænia present, and was cured. Of the 20 positive cases, 12 were of less than one month's duration, and had it not been for this test we should have had to wait for one month more before the diagnosis could have been confirmed and treatment instituted. Only one early case of kala-azar in the series failed to give a positive result.

In my experience so far with the test, I have never found a single case of fever—apart from the very chronic cases of such diseases as malaria, tubercle, syphilis—which gave a positive antimony reaction which did not turn out to be kala-azar. In a very early case a negative reaction does not exclude kala-azar, but a positive result appears to always indicate kala-azar. In the case of chronic fever, matters are different. Here an old standing, chronic case of kala-azar always appears to give a positive reaction, but so also do some cases of other diseases, such as chronic pulmonary tuberculosis, chronic malaria, and tertiary syphilis. Major Chopra has recently

advocated diluting the serum with ten times its volume of normal saline in carrying out the test on old-standing and chronic cases, and this method in my experience is certainly useful to exclude non-kala-azar cases.

The aldehyde reaction, if tested by the criteria advocated by Dr. Napier—i.e., a complete gel plus a dead white opacity—we have found to be thoroughly reliable in kala-azar cases of more than three months' standing. We have never found this reaction to be strongly positive in any condition of chronic fever other than kala-azar. In doubtful cases by this method we have tried Major Chopra's method with the diluted serum, and found this to be satisfactory by way of confirmation.

Our present position therefore is this; that all suspicious cases of more than 15 days' duration and less than 3 months' duration are tested by the antimony test. In cases of less than 15 days of fever the antimony test is unreliable. If the antimony test yields positive results, we institute treatment with antimony salts, and so far have never been misled by doing so. Occasionally the antimony test does not become positive until a later stage, and in such cases it is advisable to wait for another week or fortnight, and then to repeat the test. If it is still negative, the probability of kala-azar is negated. Should the disease have lasted for more than three months, both the antimony and aldehyde tests are applied, when both tests usually yield a positive result.

The antimony test, in brief, gives a satisfactory means of diagnosis in just that type of early case where previously one had to wait for a deepening leucopænia, or a sufficient enlargement of the spleen to render spleen puncture possible, or until the expiration of the third month of the disease for the application of the aldehyde test. With the antimony test it is usually possible to confirm the clinical diagnosis and to institute treatment before the 20th day of the disease.

The table included in this article shows the result of application of the antimony test to 51 consecutive cases of fever, where kala-azar had been suspected as the possible diagnosis.

It is realised that it was not possible for me to diagnose these cases by puncture or cultural examinations for L.D. bodies and therefore laboratory workers may doubt my diagnosis. I would like to say, however, that the clinical pictures of the cases, the leucopænia present, and the subsequent reaction to antimony treatment leaves little room for doubt as to the true nature of the disease.

My thanks are due to Major J. C. De, I.M.S., Police Surgeon, Calcutta, who took a keen interest in this enquiry, and without whose sympathy and encouragement it would not have been possible.

Results of the Antimony Test as applied to 51 consecutive cases of fever which might have been due to Kala-azar.

Date.	Patient's Name.	Aldehyde Test.	Antimony Test.	Leucocyte Count.	REMARKS.
1-7-27	Ramjatan	—	—		
2-7-27	Sudambuj	—	—		
4-7-27	Thapsigoala	—	—	2,800 per c.mm. 6,600	2,060,000 per c.mm.
	Rufinarian	—	—		
	Sukram Dubey	±	++		1 month.
5-7-27	Ram Sundar	—	—		
	Nand Kishore	±	++	3,200	1½ months.
	Sahadeo	—	—		
7-7-27	Radhika	—	++		20 days.
8-7-27	Daroga	—	—	2,400	
	Ramnarian	—	—		
11-7-27	Ragbinaj	—	—		
13-7-27	Ragbuban	—	—		
15-7-27	Ramdre	±	—		
	Sitla Prasad	—	++		5 months. ? tuberculosis. 22 days.
	Ramnagina	—	—	2,400	
29-7-27	Ganesh Dutt	++	++		3 months.
6-8-27	Raghubar	—	—		
15-8-27	Ramker	—	±	4,800	? tuberculosis.
25-8-27	Gangardhar	—	—	5,200	
	Ramdar	—	—	5,000	6 days.
28-8-27	Nandkumar	—	±		
	Tapeswar	—	±		
	Suraj Davy	—	—		
29-8-27	Narsing Misir	—	±		
	Ghorao Paday	—	±		
6-9-27	Abdul Hai	++	++		15 days.
8-9-27	Tilak Dhari	+	++	3,400	4 weeks.
	Joy Kishen Roy	—	±		3½ months.
11-10-27	Sahriar Khan	—	—	2,200	Anæmia.
	Sew Mangal	++	++	4,200	8 months.
14-10-27	Ram Lochan	++	++	2,200	7 months.
17-10-27	Harihar Singh	—	++	2,800	1 month.
18-10-27	Chaterjun	—	++		15 days.
24-10-27	Ramsahay	++	++	3,400	5 months.
28-10-27	Ram Naresh	—	—	3,000	

Date.	Patient's name.	Aldehyde Test.	Antimony Test.	Leucocyte Count.	REMARKS.
12-11-27	Ram Sakal	..	— ++	..	18 days. 26 days.
14 11-27	Durwan Lij	..	—		
18-11-27	Nathni Roy	..	—		
19-11-27	Abak Ali	..	—		
25-11-27	Rampati	..	—		
	Harihar Banerji	..	— later	3,400 2,800	22 days. Cured by antimony treatment.
Later	Fulmani	..	+	4,000	2 months.
	Boy	..	+	2,800	26 days.
	Justia Ghoshi	..	++	4,000	15 days.
	Female	..	+	3,400	2½ months.
	Boy	..	+	5,400	2 months.
	Boy	..	+	3,400	3 months.
	X ..	..	±	4,000	6 months ; apparently tuberculosis.
	Boy	..	±	6,000	6 months ; apparently malaria.
	Melitar	..	+	4,000	1 month.

A Mirror of Hospital Practice.

A CASE OF RECOVERY AFTER PERFORATION OF A TYPHOID ULCER.

By J. BA CHOW, L.M.P.,

Sub-assistant Surgeon, Syriam Hospital, Burma.

MARGOON RAI, Hindu male, cowboy, aged 20 years, was brought to the hospital in a taxi from Kyauktan, a distance of about 13 miles on the 21st August, 1927, and admitted at 7 p.m. for the treatment of acute abdominal symptoms of 28 hours' duration.

He was said to have suffered from slight fever for the past ten days. At about 10 p.m. on the 20th August, 1927, he suddenly felt severe general pain in the abdomen, with vomiting and inability to pass stools or flatus. One ounce of castor oil was taken at 10 a.m. on the 21st, but with no results. He was admitted to the Civil Hospital at Kyauktan at 3 p.m. the same afternoon; was then given an enema with no results; and was transferred to Syriam.

Condition on Admission.—Admitted at 7 p.m. very ill, with pinched appearance; hurried, shallow, thoracic breathing, 50 per minute; feeble, frequent, pulse, 130 per minute; temperature, 99.6°F.; tongue coated and dry; abdomen tense and tympanitic, with dullness in the flanks, and tenderness all over, but most marked at a spot two inches below and a little to the right of the

umbilicus. The upper quadrants of the abdomen were noticed to move very slightly, and in an opposite direction to that of the chest, while the lower quadrants remained motionless.

A diagnosis of general peritonitis—probably due to acute appendicitis—was made, and an immediate laparotomy was carried out under spinal anaesthesia; 2 c.c. of stovaine and glucose being given intrathecally. The abdomen was opened by a right lower pararectal incision, when there was a sudden gush of sero-purulent fluid with no faecal odour.

On further exploration, a swelling containing foul smelling pus, mixed with faeces, was found in the right iliac recess. An opening, about 1½ inch in diameter, was detected in the infero-lateral border of the ileum, about 6 inches from ileo-caecal valve, and from this opening faecal matter was escaping. The pus and faeces were gently mopped away and the hole in the intestine sutured.

No other perforation was detected, and the abdominal cavity was sutured with two drainage tubes, one at the lower end of the original incision, and the other in the pelvis. The appendix was normal and was not removed.

After a stormy convalescence of seven weeks, the patient was discharged cured.

Remarks.—The points of interest in this case are the following:—

(1) The fact that the sero-purulent fluid first met with was absolutely odourless, showing that

Nature was attempting to localise the trouble in the right iliac fossa.

(2) The fact that the patient almost certainly owes his life to the use of spinal anæsthesia, instead of chloroform.

(3) His recovery, in spite of the fact that his acute symptoms had been present for 28 hours, and that he had had castor oil and a long motor ride in a jolting taxi over bad roads before admission to hospital.

A FOLKLORE CHARM AGAINST BODILY INJURIES, HYPODERMIC INSERTION OF GOLD NEEDLES.

By B. R. SHENOI,

Sub-Assistant Surgeon, Civil Hospital, Tavoy, Burma.

VARIOUS prophylactic measures against evils are in vogue in different countries. Tattooing the figures of birds and animals on different parts of the body as a charm against *dah* cuts, gunshot wounds, etc., is very common all over Burma. In India, the wearing of beads, rosaries, talismans, tiger's teeth, etc., as charms against evil spirits is well known. The injection of gold needles as a prophylaxis against bodily injuries is to my knowledge rarely practised in any country, except Burma.

N. B. M., a Hindu male, aged 30, a resident of Tavoy, consulted me about two months ago for pain in the flexor aspect of the right forearm. On examination I felt something like a small needle moving under the skin below the bend of the elbow. I suspected some foreign body and on enquiry the patient informed that about six years ago, a *hpongyi* (Buddhist monk) from Siam, injected 18 gold needles in different parts of the body as a charm against bodily injuries. To prove the efficacy of the charm, the patient says that the *hpongyi*, who himself had gold needles in his body, made a cut on his arm which was not followed by any bleeding. The patient further states that he was once assaulted severely on the head by some unknown person at night, and although he was unconscious for a short time, the wound on the head did not bleed and healed by first intention.

It appears, that the *hpongyi* made the patient understand that the charm would act if he took certain precautions (given below), and that he (the *hpongyi*) would take out the needle, whenever the patient experienced any trouble. But unfortunately the whereabouts of the *hpongyi* are not known.

Precautions.—The charm is said to be temporarily ineffective whenever the patient walked underneath a house inhabited by ladies, particularly during their periods of menstruation, pregnancy or delivery.

Operation.—The patient got the gold needles made by a local goldsmith. Each needle is $\frac{3}{4}$ inch long and of the thickness of a fine hypodermic needle. The operation was very simple and quite painless. Neither antiseptics nor

anæsthetics were used during the operation. The patient was made to sit down on a mat, and the operator sat opposite to him. The needles were injected rapidly under the skin one after another in different parts of the body, with a gentle tap of the right index finger after inserting one end into the skin. Arms, forearms and thighs are said to be the favourite sites for injection. The operation was completed within ten minutes. No untoward symptoms followed the operation and the patient says that he has been keeping good health all along, though of late he has been experiencing slight discomfort in the right forearm, below the bend of the elbow.

I advised the patient to be x-rayed and to undergo operation, but he is not willing to do so, though I warned him of the danger attendant on the presence of foreign bodies in the system.

A few days ago I saw the patient again, when he made me feel two needles in the flexor aspect of the right forearm, of which one was slightly bent (this was probably the cause of the pain in the forearm), one on the inner side of the right arm, and one on the flexor aspect of the left forearm. The patient has since been free from pain in the right forearm.

A CASE OF PORRO'S HYSTERECTOMY.

By Mrs. B. E. LEWIS, M.D.,

Female Hospital, Lyallpur.

LACHMI, aged 20, wife of a labourer, was admitted to the Women's Hospital, Lyallpur, on the 28th September, 1927, sent in as promptly as possible by Dr. Jaswant Das of Dijkot, having been treated previously by indigenous *dais*.

The patient had been in labour since 12 noon on the 24th September, the membranes having ruptured about that time. The course of pregnancy up till then had been uneventful. Six years previously the patient had been delivered of a full-time living child, whilst four years previously she had suffered from some vaguely defined febrile illness.

On admission, the patient was found to be poorly nourished, and only 4 ft. 7 in. in height. There was no deformity of the spine or long bones. The temperature was 102°F., pulse 120, the tongue furred. The abdomen was extremely distended and continuously painful, and very tender. No evidence of rhythmic contractions was found. The head was not engaged in the pelvis and the foetal heart sounds were not heard. There was a foul-smelling discharge; the os admitted two fingers; and the membranes were ruptured. The pelvic measurements—(taken later during convalescence)—were as follows:—

Interspinous—7 $\frac{5}{8}$ th inches.

Intercristal—8 $\frac{3}{4}$ th inches.

Oblique conjugate—3 $\frac{1}{8}$ th inches.

The transverse diameter was so contracted that it admitted little more than one finger. An x-ray plate—(also taken during convalescence)—showed the triradiate deformity of the brim characteristic of osteomalacia.

Immediate operation was carried out by the Civil Surgeon, Lieut.-Col. R. T. Wells, M.D., F.R.C.S.E., I.M.S., under chloroform anæsthesia.

The gravid uterus was delivered completely outside the abdomen through a long incision, and packed off with swabs, the edges of the wound behind it being temporarily held together with forceps. When the uterus was incised it simply split up. The placenta was first encountered, and separated without bleeding. A full-time child was then removed. Both ovum and decidua were green and foul-smelling.

A rubber tourniquet was then tied firmly round the cervix, which was transfixed distally by two strong knitting pins. The tubo-ovarian arteries were ligatured separately, and the uterus was amputated distally to the transfixation pins. The stump was fixed exterior to the surface in the lower end of the wound, the remainder of which was sutured in layers as usual.

After operation the patient's temperature ranged between 100 and 102°F. for eleven days. The gangrenous stump became highly offensive. The patient, however, expressed complete relief on coming round after the anæsthetic, and convalescence was uninterrupted. The stump, with its tourniquet, separated on the 11th October, whilst the rest of the wound healed by first intention.

The lower end of the wound presented a deep granulating crater, which healed slowly, and the patient was discharged cured on the 6th November, when her general health and state of nutrition were excellent. She made the pathetic request that she might be admitted to the same hospital for her next confinement.

Had this patient come under observation during her pregnancy, the ideal treatment would have been Cæsarean section, with sub-total hysterectomy, at full term. Under the desperate circumstances present at the time of her admission to hospital, however, it does not seem possible that any operation other than Porro's hysterectomy would have saved her life.

This operation is generally considered as of only historic interest, but in such countries as India, where osteomalacia may give rise to extreme degrees of pelvic contraction, and where antenatal care is unknown, it may evidently still find application.

My thanks are due to Colonel Wells, I.M.S., Civil Surgeon of Lyallpur, for permission to publish these notes.

DEEP INFILTRATION ANÆSTHESIA OF THE ORBIT IN EYE OPERATIONS.

By R. A. KALLE, M.B., B.S.
Sirsi, Kanara District.

I HAVE read with great interest the article contributed by Major J. N. Duggan, D.O. (Oxon.), of Bombay, describing in detail the method of deep infiltration anæsthesia of the orbit. Since then I had occasion to use this

form of anæsthesia in 11 cataract operations and in 2 cases of sclero-corneal trephining operations for sub-acute glaucoma. Though this is not in itself a big record to go upon, yet the uniform success which I got in these cases encourages me to write this note. The object of this method is to block the motor and sensory nerves coming from the ciliary ganglion. If the injection is well made, it is surprising how complete the anæsthesia is, so much so that I am inclined to use this as a routine method. Given a sharp pointed, fine needle $4\frac{1}{2}$ cms. long, the injection of the novocaine solution itself is quite painless. Even in enucleation of the eyeball Major Duggan writes to me to say that if the strength of the novocaine is increased to a 4 per cent. solution, there is no pain, even while cutting the optic nerve, provided the injection is well made.

As the amount of eye work that I get here is not great, I prefer to use novocaine and suprarenalin solution 2 per cent. supplied ready-made in ampoules. I have found this solution quite satisfactory.

For those in the mofussil who do not usually work under ideal conditions and who have frequently to depend upon unskilled assistants this method of anæsthesia is particularly useful. When once the injection is made the interval of 40 minutes (the usual time to be allowed between the injection and operation) can be advantageously utilised in looking after the sterilisation of instruments, etc.

I should be pleased to see recorded in your journal the experience of those who have used this method. When authorities like Major Duggan recommend this method, it would be a presumption on my part to do so, yet to those who take an interest in this field of surgery I would recommend a close study of his article.

This method was proposed by Duverger of Strassbourg in 1918 (Ball), but the credit of bringing it to the notice of ophthalmic surgeons in India belongs to Drs. Green and Icove of America and to Major Duggan who has brought it to the notice of the readers of your journal.

SODIUM CACODYLATE IN THE TREATMENT OF BOILS.

By BIDHUBHUSAN GHOSH, L.M.F.
Shahazadpur, Pabna District.

LAST year, though the summer and rainy season were not very hot, yet summer boils were a constant source of trouble to many children and young adults in this part of Pabna District. Children between the ages of 3 and 7 were the patients most affected, the head and forehead being the favourite sites, though the extremities were not exempted.

In March 1927, I had ten cases, most of them children of poor stock. I tried the usual routine treatment, and tinct. ferri perchlor., digitalis, quinine, citric acid, potassium chlorate, belladonna, etc. Two of the patients could afford to

buy vaccine, and these two cases promptly cleared up. In the others fresh crops of boils continued to appear, despite the most careful aseptic technique and treatment.

At the time I had under treatment a patient suffering from chronic asthma, who also developed boils. I treated him by hypodermic injections of sodium cacodylate for the asthma, and to my surprise all the boils cleared up after the first two injections. I then began to treat all my cases of furunculosis by hypodermic injections of sodium cacodylate, given on alternate days, and found this method of treatment invaluable. Not more than four injections are necessary as a rule before all the boils clear up, and no further ones appear.

Furunculosis is so common a complaint that its treatment is rather neglected, but in sodium cacodylate we appear to have an almost specific cure for the complaint.

A CASE OF MELANOTIC CARCINOMA.

By B. R. SHENOI, L.M.P.,
Civil Hospital, Tavoy, Burma.

CASES of melanotic carcinoma which rapidly end fatally are rare. The case cited below may, therefore, be of some interest to the readers of the *Indian Medical Gazette*.

M.C.M., aged 44, a prisoner from the local jail was admitted to the Civil Hospital, Tavoy, on the 22nd April, 1927.

Previous History.—The patient was the headman of a village in the Tavoy District and was in good circumstances before conviction. He was sentenced to 3 years and 6 months' rigorous imprisonment and was admitted into the District Jail, Tavoy, on the 20th August, 1924, in good health, and he continued to keep good health in the jail for two years thereafter. On the 20th December 1926 he was admitted into the Jail Hospital, Tavoy, for the treatment of a left femoral bubo, which was operated upon the next day under chloroform and the diseased glands were removed. The patient made an uneventful recovery and was discharged cured on the 30th December, 1926. About two months later the patient struck his left foot accidentally against a stone, which resulted in an ulcer on the sole of the foot for which he was treated as an out-door patient. The ulcer, however, got worse and looked like a chronic fungating growth at the time of admission into the jail hospital on the 9th April, 1927. The left femoral glands were found to be enlarged, painful and tender. Enlargement of the left iliac glands followed in the course of a day. The patient ran a hectic temperature. On the 11th April, 1927 fluctuation was elicited in the femoral region. On the 12th April, 1927, the bubo was incised under chloroform, pus let out and the diseased glands removed. The patient was apparently well after the operation and the temperature came down to normal. On the 17th April, 1927, however, the

evening temperature suddenly rose to 105°F., and was followed in a few hours by distention of the abdomen, retention of urine, and motor paralysis of the lower extremities with retention of sensory function. Bedsores formed three days later, followed by incontinence of faeces. He was transferred to the Civil Hospital, Tavoy, on the 22nd April, 1927, for further treatment, as proper facilities for nursing do not exist in the Jail Hospital.

His condition, however, got worse day by day in spite of careful nursing and treatment, and he died on the 28th April, 1927.

On post-mortem examination the following pathological changes were noticed:—

1. Destruction of the 2nd rib on the right side.
2. Destruction of the body of the 2nd dorsal vertebra.
3. Nodular deposits of various sizes in both lungs.

The viscera were sent for examination to the Director, Pasteur Institute of Burma, Rangoon, for histological investigation, who reported the condition to be melanotic carcinoma with secondary deposits.

Peculiarities of the Case.—(1) The trivial injury which, if one can say so, acted as an exciting cause for the malignant growth on the sole of the foot.

(2) The sudden onset of malignant disease after receipt of the injury.

(3) The fatal termination of the case within an unusually short time after the appearance of the disease.

(4) The absence of local signs and symptoms in spite of extensive destruction of the 2nd rib on the right side.

(5) The uncommon and rapid destruction of the 2nd dorsal vertebra, due to secondary deposits from the original growth on the sole of foot, followed by motor paralysis of the lower extremities with retention of sensory function.

In conclusion I desire to express my grateful thanks to Dr. B. T. Chain, B.A., M.B., Ch.B. (Edin.), Civil Surgeon and Superintendent and Medical Officer of the District Jail, Tavoy, for the previous history of the case and for granting me permission to publish these notes.

AN INTERESTING CASE OF THE LIPOMA OF THE CHEEK.

By CAPTAIN B. P. DARUVALA, M.C.P. & S.
(Deolali).

A MALE aged 30 years was passing by my dispensary, when I noticed a swelling on his right cheek, and being interested in doing surgical work I called him and asked him as to what the matter was with his cheek. He at once opened his mouth and caused a pedunculated tumour to project from his mouth, as shown in Fig. 2.

I call this case interesting, for the reason that usually fatty tumours bulge outwards and have

a tendency to grow externally, whereas this tumour pointed inwards in the direction of the buccal cavity contrary to the usual observation, and it presented an appearance of a polypus



Fig. 1.

protruding from the os uteri. I have sent two pictures of this patient, one to show him as he appeared to the observer from a distance (Fig. 1),



Fig. 2.

and the other to show to the reader the picture of the tumour as it appeared on closer inspection (Fig. 2).

The patient having agreed to operation, it was carried out in the following manner. The tumour was made to protrude through the mouth, as in Fig. 2. A clamp-forceps was applied to the pedicle and the mucous membrane was incised in front of the forceps and the tumour separated by a few touches of the knife. There was no bleeding to speak of. Lastly, the wound was sutured, and healed in due course of time.

A NOTE ON THE INTRAVENOUS ADMINISTRATION OF SODIUM BICARBONATE IN BLACKWATER FEVER.

By EDMUND BURKE, L.R.C.P., L.R.C.S. (Edin.),

Medical Officer, Bishnauth Medical Association (East Boroï Section), Assam.

H. M. HANSHELL of London records an interesting case of blackwater fever in a European male patient which he treated by intravenous infusions of sodium bicarbonate alone with remarkable results. This was in September 1925.

A month later (October 1925), Baker and Dodds published the results of their experiments with regard to intra-renal obstruction, such as was observed in two patients who died from renal insufficiency following transfusion of incompatible blood.

Referring, in part, to Hanshell's more extensive paper, perhaps the following brief resumé of the results of Baker and Dodds' work may here be mentioned before describing a very interesting case. Their conclusions, briefly put, were that hæmoglobin introduced into the circulation is excreted by the kidney. Thus:—

- (1) If the urine reaction be above pH 6, the hæmoglobin will all be excreted as oxy-hæmoglobin; the urine red, and no ill effects result.
- (2) If the urine reaction be below pH 6, and there be a sufficient concentration (1 per cent) of Na Cl, brown pigment will be precipitated in the tubules.

These workers show that in cases of hæmoglobinuria the factors leading to precipitation of brown pigment in the uriniferous tubules are acidity and salt concentration of the urine, and that the treatment should be one that will prevent undue hæmoglobin precipitation in the tubules such as occurs in blackwater fever.

They indicate that, as distinctly acid urine with a reaction below pH 6 is the chief and most favourable factor in producing this so often fatal blockage of the kidney tubules in blackwater fever, an alkaline state of the blood is essential for the prevention of such an occurrence in the course of the malady. The administration of alkaline diuretics or transfusions would, therefore, seem most appropriate if treatment is to be effective.

Such was Hanschell's method, and it was only after the work of Baker and Dodds had been published that he decided to record his single case thus successfully treated.

The writer recently had the good fortune to attend a very severe case of blackwater fever within four hours of the onset of hæmoglobinuria and it was decided that sodium bicarbonate should be administered intravenously. The result of the treatment being remarkably successful, the writer ventures now to record the case in order to confirm one well-known observer's findings, and with the hope that it may prove of interest to others.

Case.—Babu A. Kumar Das, Hindoo, aged 27 years, of Borma Jan Tea Estate, Assam. Had had fever on and off for some years though never severe. Had never taken "prophylactic" quinine. Always fairly healthy but for the mild bouts of fever.

October 8th, 1927.—Patient developed fever (101–103°F.) more severely than any previous attack. Had lumbar pain and severe bilious vomiting.

October 9th, 1927.—At 10 a.m. he passed about 3½ ozs. of dark brown urine. At 11 a.m. less urine passed, the colour now being absolutely black. The writer was then summoned and reached the patient at 3 p.m. No more urine had been passed since 11 a.m.

Clinical Picture.—Patient had deep jaundice, an anxious facies, severe headache, profuse and frequent bilious vomiting, shallow respiration, a rapid, weak pulse of 130. Heart sounds feeble and hæmic murmurs present. Temperature 104.6°F.

Bad bilious diarrhœa present, 7 or 8 motions having been passed between 9 a.m. and 3 p.m.

No treatment had been possible by the mouth owing to the severe vomiting.

The alkaline treatment described by Hanschell was adopted, and accordingly 150 grains of sodium bicarbonate were dissolved in 20 fluid ounces of distilled water, the whole being then sterilized by boiling for 5 minutes.

No infusion apparatus being quickly available an ordinary 20 c.c. all-glass syringe was used and the drug administered intravenously 20 c.c. at a time.

This laborious and somewhat precarious procedure was continued until 17½ ounces of the solution had been administered when the patient began to react so severely that the last 2½ ounces were withheld.

A hypodermic injection of strychnine and digitalis was given and the patient gradually recovered. No other drug was used after this.

At 5-10 p.m. (1 hour after the infusion) 5 ozs. of urine were passed naturally—the first since 11 a.m. and the colour was now dark brown with much deposit. Vomiting still continued, nothing being retained if given by the mouth.

15 ozs. of warm normal saline were then given per rectum and retained.

By 6 p.m. the pulse was noticeably improved. Patient's general state better. Bilious diarrhœa had stopped. Vomiting now showed signs of abating. 8-55 p.m. 8 ounces lighter coloured urine passed.

Diuresis seemed immediately and definitely established, and by midnight the urine was of a bright port-wine tint and clear.

That night the patient slept for 4 hours. Eighteen hours after the sodium bicarbonate infusion the urine was absolutely normal in colour and quantity and there were no deposits of any kind.

One or two slight rises of temperature occurred for the next two days, the urine then becoming a little darker and cloudy. After that as much as 1600 to 1800 c.c. of urine were passed in 24 hours though albumen was present in fairly heavy deposit now.

Convalescence progressed rapidly, though the patient nearly collapsed on the eighth day while struggling during the administration of an enema for obstinate constipation following the former bilious diarrhœa.

On the twenty-fourth day the patient was considered cured, and after a brief treatment for his weakness and anæmia proceeded on a month's holiday to fully recuperate.

Interesting features are:—

- (1) The patient was never in the habit of taking "prophylactic" quinine. His blackwater fever therefore was not connected with abuse of this drug.
- (2) No other drug was used throughout the illness except the sodium bicarbonate. Water, of course, was pushed after the vomiting ceased.
- (3) The marked diuresis and rapid return to normal of the urine produced by the comparatively small amount of sodium bicarbonate given—17½ ozs. (Hanschell gave his case two infusions of one pint each.)
- (4) The sodium bicarbonate undoubtedly promoted rapid and definite diuresis with alkalinity, thus preventing suppression from renal obstruction due to precipitated hæmoglobin in the kidney tubules.

In closing I must acknowledge my indebtedness to my patient for proving so interesting a case, for submitting to the experimental treatment, and for his permission to publish his name.

My thanks are due also to Babu N. Lallâ, my assistant, for his well kept case-notes, for carefully measuring the numerous samples of urine, and for his careful nursing of the patient.

Note:—Since writing this report I have heard the regrettable news that my patient and his wife both died of cholera on December 17th, while on holiday.

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A CASE OF MELANCHOLIC ATONIA OR PSYCHOCOMA.

By A. BAYLEY DE CASTRO,

LIEUT., I.M.D.,

Junior Medical Officer, Haddo, Port Blair, Andamans.

IN the *Indian Medical Gazette* for August 1920, a case of psychocoma is recorded by Major St. John Moses, I.M.S., from the Berhampore asylum; and although Ewens says in reference to this phase of insanity that "it is a condition not at all infrequent in Indian asylums," I have only had one admission into the small asylum under my charge in Port Blair during the past seven years. Overbeck-Wright gives a very accurate though long definition of this disease in which he includes the three stages of katatonia.

In this so-called stuporous type it should be remembered that there is no true stupor—but that this name is applied because of the immobility and mutism of the patient.

Stoddard considers katatonic stupor to be the most characteristic variety of dementia præcox, and this raises the point as to whether such cases should not be diagnosed dementia præcox straight away, instead of calling them by the fanciful names of melancholic stupor, atonia, or psychocoma. Katatonic depression was first described by Kahlbaum in 1872. Such patients go through a prodromal stage, and my patient no doubt was going through his prodromata when caught and sent to me.

The history of the case and symptoms are as follows: No. 44922, a young well developed Moplah of about 27 years of age, was found wandering about in the jungle on the 11th December, 1926. He had been absent from his station for three days. He had a very vacant expression, took no interest in his surroundings, answered questions with difficulty and then only after repeated questions.

Reflexes normal, and no Argyll-Robertson pupil. Spleen $1\frac{1}{2}$ " below the left costal margin. Liver normal, and *Plasmodium falciparum* rings in the blood.

Differential blood count showed:—

- 47% Polymorphonuclears.
- 48% Lymphocytes.
- 2% Large Mononuclears.
- 3% Eosinophiles.

While a total leucocyte count gave 13,750. The hæmoglobin value was 80 per cent. A marked leucocytosis is one of the features of the depressed variety of katatonia or psychocoma.

The patient was of course put on to active antimalarial treatment with the hope that all his trouble was due to this: and certainly as far as the malaria was concerned rapid and permanent results followed, but not so with the mental state which by now (5-1-27) had advanced further. The notes for that date state that "he will not answer questions, is not keen on his food—remains in his cell in queer postures (sits at times bent over to the right side, or while in a squatting

posture throws his head either forwards or backwards or else lies on his left side curled up). He does not like being interfered with." He always kept his eyes tightly shut, and showed marked resistance when they were forcibly opened. He always had to be coaxed to eat, but on the 9-1-27 he refused food altogether, and forcible feeding had to be resorted to: a few days after this he started to take milk and congee but refused all solid food.

The face muscles remained fixed, the eyes tightly closed and from now (20-1-27) he was always found lying on the left side with his legs fixed; (thighs flexed on abdomen, lower leg from the knee down flexed on back of thigh) and arms crossed over the chest. A slight mucous secretion was found exuding from the external canthus of the eyes.

Constipation was very marked, all reflexes remained normal, and no trophic lesions of the skin developed all through the period of his illness. On the 14-2-27 patient opened his eyes and spoke. He asked for a drink of water, a few minutes later he once again laid down, coiled himself up, shut his eyes and lapsed into his former state. 20-4-27—Lies in an inert manner all day and night in one corner of his cell, the body being kept in a state of flexion.

This condition and state of affairs lasted till the 15-7-27, when a very sudden and wonderful change occurred. The patient now suddenly woke up. From now to the date of his transfer to India in October 1927, there is nothing special to record. His intelligence did not return all at once, but gradually, and finally before he left the asylum he had become fat.

Ewens states that "obstinate resistance with retention of memory and consciousness are marked and indeed essential features." This was most strikingly displayed in my case.

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SPECIAL REPORT.

THE SEVENTH CONGRESS OF THE FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, held at Calcutta, from December 5th to 10th, 1927*

No more brilliant or more important medical congress has ever been held in India than the Seventh

* In constructing this special report, the reviewer would like to acknowledge his indebtedness to several different sources; to the columns of the *Calcutta Statesman* and *Englishman*, from which he has borrowed freely, especially with regard to the opening and closing sessions of the Congress; to the different individual 'rapporteurs' of different sections of the Congress, who have supplied him with notes or complete reports of their sectional sessions; and to others who have contributed notes, corrected sections of the MS. or supplied information.

Biennial Congress of the Far Eastern Association of Tropical Medicine, which was held in Calcutta from December 5th to 10th, 1927. The Congress was especially remarkable in two respects; the large number of distinguished foreign delegates, and guests of the Government of India, who attended it, and the tributes which were paid by our visitors overseas to the medical research work which is going in India at present. There was no lack of the latter; indeed, the general impression which one gathered from the remarks by our guests was that they had previously had no conception of the extent and the degree of organisation of medical research work in India. This is perhaps not surprising; the Indian Research Fund Association was organised by the late Sir Pardey Lukis in 1906-07, and is a much older body than the National Medical Research Council of Great Britain, which was organised in response to the necessities of the Great War. In organisation and breadth of programme the Indian organisation bears favourable comparison with the much wealthier organisation in Great Britain. Perhaps one of the most important results of the Congress will be to broadcast and make known the work which is being done in India, and to establish closer touch with workers in other countries in Asia.

The official foreign delegates numbered some 95. They included representatives of the Medical Research Council of Great Britain (Sir Walter Fletcher); the League of Nations (Professor Theodore Madsen of Copenhagen); the British Ministry of Health (Lt.-Col. S. P. James, I.M.S., ret.); and the Rockefeller Foundation (Dr. Victor G. Heiser); together with official representatives of some 18 Asiatic countries outside India, and delegates from Australia and Egypt.

It is difficult in retrospect to give any connected narrative of the Congress, for its activities were very widespread. No less than six sessions met daily, and the number of papers presented exceeded 240. It is nevertheless perhaps possible to attempt at this early stage to give, as it were, a bird's-eye view of the Congress.

OPENING CEREMONY.

Approximately 1,000 delegates and members were present at the opening ceremony which was held in the Senate House of the Calcutta University at 10 a.m. on Monday, December 5th. The proceedings were opened by His Excellency the Governor of Bengal (Sir Stanley Jackson), and we take the following abstract of his speech from the *Statesman* of the following day:

In opening the proceedings His Excellency the Governor said: "Gentlemen, I deem it a great privilege to have the honour of opening this Congress to-day. His Excellency the Viceroy has asked me to convey a message to you which I will now read:—

"It is with great pleasure and with a keen sense of the importance of the occasion that I welcome your Association to-day. India early recognized the possibilities of the movement which started, I understand, by the enterprise of a small group of earnest workers in Manila in 1908, and has progressed until now it embraces nearly all countries of the Far East, and is generally recognized as the most representative and authoritative organization dealing with the public health and diseases of warm climates. We are, therefore, highly gratified to have the opportunity of welcoming its members to India, where there are still such great opportunities for those interested in medical research. Indian representatives on your Association have been hospitably entertained in the past in Manila, Hong-kong, Saigon, Java, Singapore, and Tokio. I trust that our guests may carry away as pleasant recollections of this Congress as our own delegates preserve of previous gatherings elsewhere. I wish your Congress all success. I feel sure that the free interchange of thought and the opportunities for meeting, under pleasant social conditions, workers of different nationalities and varying experience will have a real value for those who are gathered here to-day."

Continuing, the Governor remarked: "This is the Seventh Congress of the Far Eastern Association of Tropical Medicine, though it is the first to be held in Calcutta. The history of medicine in India begins with the Vedas, which are believed to date back to 1500 B.C. but the best known names in connection with Indian medicine are Sushruta and Charaka, who flourished about five or six hundred years before the beginning of the Christian era. Their writings are, I understand, still revered by many practitioners of medicine in India, and all of us can unite in paying homage to these great men of old who lived and worked before the time of Hippocrates.

"The modern history of medicine in Calcutta contains some names of special interest to workers on tropical diseases. The names of Timothy Lewis and David Cunningham will be familiar to many of you. Their work was done at a time when interest in medical research was low, and so their discoveries have not received the recognition which they deserve. You are all familiar with the epoch-making discovery which was made by Major Ronald Ross, about thirty years ago. You will be interested to see here in Calcutta the little laboratory in which he toiled and wrested from Nature her jealously guarded secret of the transmission of malaria. It is a matter of great regret that Sir Ronald, now full of years and honours, is prevented by ill-health from being with us to-day. You are also familiar with the work of Sir Leonard Rogers, who worked for many years in the Medical College, where many of your meetings will be held.

"Sir Leonard was not merely a research worker, but he was responsible for the erection of the new School of Tropical Medicine and Hygiene in which a small band of workers are engaged in pursuing the researches which were, and still are, the obsession of Sir Leonard's life. The work done by Ross and Rogers will always be proudly remembered in India, and this School in Calcutta is a fitting and worthy monument of their labours, skill and perseverance. There are men who are now engaged in medical research in Calcutta and doing splendid work. You will see them for yourselves and I am sure that they will greatly appreciate the opportunity of exchanging ideas with fellow workers from Japan, China, the Dutch East Indies, the Philippines, Indo-China, the Federated Malay States and the other countries of the Far East, as well as workers from America and Europe. Your presence here is most gratifying, and for two reasons, one is that we may show you what is being done here; and what is perhaps more important, that we may learn from you and obtain suggestions for the improvement of our work.

"Among our welcome guests are men whose names stand out pre-eminent in the domain of medical discovery. Drawn from all nations of the world, they possess a wide and varied experience of the ravages of tropical diseases—many of them have fought all their professional lives with these enemies of humanity and in many cases have defeated and exterminated them. During your visit you will discover and appreciate the vastness and complexity of the problems which confront our workers in India, and if you make your survey of India in a sympathetic spirit, you will probably realize the serious efforts which are being made in Bengal and all over India for the control of disease.

"From the early days of British rule in India the importance of public health was realized, but the policy of Government was based on the view that it was necessary first of all to educate the people and to secure their goodwill towards public health measures. For this reason attention was first concentrated chiefly on medical relief. This may not have been the quickest way but it was probably the surest and safest, and that the policy has justified itself is proved by a steadily growing demand not merely for doctors, but also for health officers. Prevention is better than cure, but we cannot force preventive measures on unwilling people any more than you can compel a horse to drink merely by bringing him to the water.

"There are some hopeful signs in Bengal. I am informed that thousands of people are coming for intravenous injections for the treatment of kala-azar which is one of our special scourges. Inoculation against cholera is readily accepted by people who a few years ago would have resisted to the death. People with early leprosy are coming forward in numbers for treatment, and generally there is a gratifying increase of the receptiveness of the people for modern methods of treatment and prevention of disease. Another hopeful sign of the times is the rapid rise of voluntary co-operative societies for the control of malaria and kala-azar; the success of these is chiefly due to the efforts of a former assistant of Sir Leonard Rogers—Rai Bahadur Dr. Gopal Chandra Chatterjee.

"The awakening of a spirit of self-help is a great advance; it greatly facilitates the work of Government agencies and it is likely that Dr. Bentley will be able to show you how rapidly the attitude of the people is changing. Apathy and indifference are disappearing and in many places there is an embarrassing demand for preventive measures, especially against cholera. More inoculations against this disease have been carried out in the past few months than in all the years since the introduction of anti-cholera inoculation. If we lay stress on the hopeful signs, you must not imagine that we minimize the difficulties which still lie ahead; the obstacles to advance have not yet been swept away, but it is important that they are beginning to yield and it is likely that we are approaching a period of interest in public health which will require even more tactful handling than the prolonged apathy of former generations.

"Research work appears to have outstripped the practical application of the results of research, but we cannot afford to call a halt in research. Every new important discovery has a great value in promoting the efficiency and economy of public health measures. The recent discoveries in connection with the treatment of kala-azar have made it possible to organize a campaign against that dreadful disease, whereas a few years ago we have had to look on while the people died miserably. The discoveries which remain to be made in the future will doubtless be of great value in simplifying the problems of preventive medicine, and it is for this reason that the Congress of Medical Research Workers have been welcome guests in every country which they visited.

"Such a Congress as this should be welcomed to Bengal as a relieving army to the besieged. We in this Presidency are unfortunately the victims of several virulent scourges such as cholera, which at the moment it very rife, malaria and kala-azar, and we are hopefully looking to the results of your deliberations to help us along the road towards some relief.

"I beg to offer this Congress a hearty welcome to this city and to Bengal and to express the hope that their stay here may prove enjoyable and that your memories, when you leave, will be in all respects satisfactory and agreeable."

The President of the Congress, Major-General T. H. Symons, C.S.I., O.B.E., K.H.S., I.M.S., Director-General, Indian Medical Service, then delivered his opening address. In extending a welcome to the delegates he said:—

"This is the first time the F. E. A. T. M. has honoured India in making it its centre of activities; I can only hope that it will not be the last. I can assure those who have come from afar that India is prepared to give you of its best and we hope most sincerely that you will go away with very pleasant recollections of your visit. As President of this great assembly I am sure you would like me to take this opportunity of expressing our thanks to His Excellency Lord Irwin, the Viceroy of this great country, for his message of welcome, sympathy and encouragement which His Excellency Sir Stanley Jackson has just read out to us. It is most fortunate that we should have at the head of the administration of this

country a man of such sterling qualities, immense capabilities and sympathetic tendencies towards our work, and we regret most sincerely that His Excellency is not able to be here to-day.

"His Excellency Sir Stanley Jackson, the Governor of this Presidency, most kindly consented to open the conference and it is my pleasurable duty, Sir, to thank you on behalf of all present, not only for coming here to-day and opening the conference at no inconsiderable inconvenience to yourself, but also for taking such an interest in the proceedings, and extending your hospitality to members at a Garden Party and a Reception at Government House.

"I would like also to thank this City of Calcutta for the welcome which it has extended to the members of the Congress."

Describing the purpose of the Congress the President continued: "These conferences—and the same applies to all medical conferences the world over—are held mainly for one purpose, the increase of our knowledge of disease. Race, religion, colour and sect form no barriers where scientific medicine is concerned. If we as a profession can so combat disease that big epidemics, infantile diseases, and preventable scourges like tuberculosis, cholera, syphilis, leprosy, etc., become either diseases of the past or continue to exist only to a greatly reduced extent, surely we shall have done a great thing for future generations.

"It is an important feature of such congresses as this, that they emphasize to our profession and to the public the great importance of measures against disease in tropical countries, and bring home to the government of such countries a fuller realization that the organization of adequate public health administration is one of the greatest of their many responsibilities.

"Whenever I think of the work done, and often under the most adverse conditions, by the members of medical scientific associations, it always leaves me with two very satisfactory feelings. The first is the amount of work which is being carried on whereby the secrets of Nature are being investigated and turned to the advantage of mankind generally; the second that I have the honour of being a member of that profession which, I have no hesitation in saying, is second to none. Instances are many where the worker has gone out into the garden of pestilence never to return. The death in 1924 of Major Cragg, I.M.S., from typhus fever which he was investigating was a serious loss to our Research Department, while the recent tragic death of Adrian Stokes is so fresh in your memories that it requires no words of mine to remind you of it. He met his death whilst putting the finishing touches to an investigation of one of the most virulent and fatal diseases known to man."

Referring to the problems that exist in connection with epidemic diseases in India, General Symons said: "You will realize that India is not a country, in the ordinary sense of the word, but is rather a sub-continent; it is in fact equal in area and more than equal in population to Europe minus Russia. If you grasp this fact you will at once see how difficult is the question of tackling all the interesting and important questions which arise in connection with epidemic diseases. Another point—India is a country of many races, religions and languages. You may say there are many languages, religions, etc., even in Europe, but I can assure you that the north and south inhabitants of Europe are by no means so far apart as the north and south population of this country. If I were asked to point out similarities between the Pathan of N. W. India and the Tamil in Tuticorin I would find it difficult to do so.

"During the course of your tours I think it is more than probable that you may at times jump to the conclusion that perhaps more could have been done along the lines of public health and sanitation. I assure you that there is no body more alive to this fact than the medical profession in India. In this connection special difficulties exist. Practically all medical relief in this country is State aided and the

State or rather multiples of States are—like most other States in the world—in a chronic condition of trying to balance their budgets. Help from private individuals, those who could afford to come forward handsomely, is not so frequent as we would wish. Moreover when we are presented with a hospital, very rarely is it endowed, so that not infrequently its utility is seriously interfered with for want of funds.

"Then we have the psychology of the population to consider. The average individual either through ignorance or apathy—more frequently the two combined—does not want any improvement in the standard of living. He is quite content to carry on in the same groove as his ancestors did before him, and you may take it from me, that it takes a mighty big jolt to shift him out of that rut. There are some who speak disparagingly of the work done by the medical profession in India. They either know nothing concerning the subject, or do not realize what the profession is up against. There may be instances where individuals have not perhaps given of their best; that applies to every walk in life; but, speaking as the head of the medical profession in this country, I can assure you that we are quite prepared that our work should be judged by the best of all judges and critics—time, feeling confident that the mound of knowledge which we have helped to erect, the work which has been carried out, on occasions even with loss of life, will stand as a monument to our activities and testify to what was done to try and improve the conditions.

"You will expect me to give some idea of what has been done in this country in tackling the subject of disease. You are already aware that India is the home of many epidemic diseases—diseases which have a bearing of a world-wide nature. I have only to mention cholera and plague to create many thoughts and remind you of many incidents in connection with these two scourges. Then again India is rife with diseases like enteric fever, malaria, venereal, kala-azar, small-pox and the like. A lot has been done and is being done to combat these diseases, and when I tell you that only last February, March and April there occurred a pilgrimage at Hardwar when eight millions visited the shrine from all parts of India during a period of 90 days and only 58 cases of cholera occurred, you will at once realize how thorough must have been the arrangements, because those of you who know anything about these pilgrimages know that the material is always there and only requires the spark to bring about an enormous outbreak. I visited the town just before the most important day and was greatly impressed by the prophylactic measures which had been put into practice. Protection of such a number against cholera by inoculation was impossible, even if the pilgrims had been willing to submit to it. I have mentioned the above incident, because it demonstrates concretely the kind of problems which the Public Health Department is called upon to face in India and, incidentally, the very thorough manner in which it was tackled.

"Plague is another disease which causes us a great amount of anxiety. It was first introduced into Bombay in 1896, and, finding a suitable soil, and environments which were pre-eminently favourable for its rapid dissemination, it spread rapidly throughout the Bombay Presidency. Such a disease called for drastic measures and at the time the only one which proved efficacious was immediate and complete evacuation of the infected area. Thanks to the original work done in the Research Institute at Bombay a vaccine was discovered which has proved to be most effective as a prophylactic. Nowadays immense quantities of this prophylactic are being used annually. In the province of the Punjab alone seven lakhs (7,00,000) of doses were given during 1926. This will give you some idea of the work. Such of you as go on the tour will be able to see the large scale production of this vaccine at the Haffkine Institute, Bombay.

"Malaria yearly claims many victims; in fact far too many. The prevention of this disease in a country

like India is a matter on which those of you who are interested will be able to take part in the discussions of the scientific sessions."

In conclusion the President said: "We are carrying on the good work in this land of India. We are aware that the field is large—I might say immense. In the face of great difficulties which are ever present we mean and are trying to place this sub-continent in its proper place in the world of scientific medicine and we hope when we leave that those who follow will see that the position is maintained."

After the opening session, the Congress divided itself into six sections which held simultaneous meetings morning and afternoon from Monday until Saturday. The subjects dealt with were so numerous, and the discussions covered so much ground that it is impossible to deal with them comprehensively. We may choose, however, certain of the more important subjects dealt with individually for report.

MALARIA.

Malaria Control. Perhaps no section of the Congress was of more vivid interest than the discussion on malaria control, which occupied two days in the crowded lecture theatre of the Medical College. There were present some of the most distinguished malariologists in the world, and the proceedings were listened to by a very large audience. Professor J. W. W. Stephens represented the Liverpool School of Tropical Medicine; Sir Malcolm Watson the Federated Malay States; Lieut.-Col. S. P. James, I.M.S., (retd.), the British Ministry of Health; Dr. Hoops and Dr. Scharff came from Singapore; whilst India was represented by Colonel S. R. Christophers, F.R.S., I.M.S., Major J. A. Sinton, V.C., I.M.S. and Mr. R. Senior-White; and Bengal by Dr. Bentley, Dr. C. Strickland, and Mr. M. O. T. Iyengar. These names alone will give some indication of the importance and impressiveness of the occasion.

The proceedings opened with a paper by Sir Malcolm Watson in which he outlined the present and future of malaria control in the F. M. S. He outlined the compulsory legislation by which landowners are either compelled to keep down malaria on their holdings, or to pay for the expenses of so doing; the 27 years of practical experience of the problem in Malaya; the organisation for control, both central, urban and rural; the possibilities of a malaria tax; the cost of anti-malarial measures and, briefly, the splendid results obtained.

This was followed by an extremely interesting account by Colonel James of anti-malarial measures in poverty-stricken regions. This was based on a report presented to the League of Nations by a special Commission appointed to study conditions in Bulgaria after the Græco-Turk war. Here the conditions were almost indescribable; for a destitute population of more than two million poverty-stricken refugees had to be repatriated on land which was practically a malarial swamp. There was no money for anything, and the situation was met—in a fashion rather characteristic of the League of Nations—by raising a loan of 24 millions sterling in Great Britain. The problem which the Commission had to solve was the best way of expending this grant.

Briefly, the Commission came to the conclusion that the usual anti-larval methods, which have been adopted with such striking success in the Federated Malay States and Panama, were here impossible. In general they recommended three procedures; (a) the wholesale free issue of quinine by the State; (b) an educational propaganda to try and teach the people to kill off adult mosquitoes in their homes; and (c) 'bonification.' As Colonel James explained, the term 'bonification' has been much misunderstood. It does not mean anti-mosquito measures, but general engineering works intended to improve the soil and raise the economic status and physical efficiency of the population. The result of such bonification schemes in Italy and

Holland has been to reduce greatly the amount of malaria among the peasantry, in many places without appreciably reducing the prevalence of the transmitting mosquitoes—a condition of 'anophelinism sine malaria.'

Colonel James' paper was followed by one by Dr. Scharff, who dealt with the organisation of the intensive anti-mosquito campaign in the rural area of Singapore. The results of the 1922-27 campaign were explained, and a vivid picture presented of the splendid results achieved, and the economic gain resulting. Singapore, despite its situation and climate, is now almost free from malaria. The comparative cost of temporary versus permanent measures was dismissed. The cost of the measures incurred has been far less than the cost of a wholesale free issue of quinine would have been.

The rubber plantations of Malaya have grappled with malaria with the greatest success. The Indian tea industry is taking active measures; the Indian railways are appointing malariologists. Malaria costs a commercial industry more financially than the saving which results from its eradication, and the planters of Malaya and Ceylon and Assam are no fools. Yet there are to-day dying villages and towns in the Punjab, which, had they been in the United States, would have imposed upon themselves a malaria tax in order to eradicate the pestilence.

In the discussion which followed, it at once became clear that the workers in the tropics largely disagreed with Colonel James' views. They were nervous in the first instance lest provincial and other administrations might take the report of the League of Nations' Commission as an excuse for reducing or abolishing anti-malarial grants. In the second place they gravely doubted the value of wholesale free distribution of quinine to control malaria, for the work of recent years has shown that the habitual taking of quinine will not protect man against infection by the mosquito; it will only render the malaria less severe when it does occur. In the third place, they doubted whether adult mosquitoes could be caught or destroyed in the dark smoke-infested huts which had been shown on the screen. Wherever anti-larval measures have been applied on a sufficiently well-organised scale, malaria has been eradicated. Several speakers emphasised that it was anti-anopheline control, and especially anti-species control that was most effective. And what has been done in Malaya can be achieved in India if only the money, men, and munitions are forthcoming.

A still further factor which was discussed by the meeting was that engineers often create malaria. When large irrigation projects are carried out without the health authorities being consulted, anopheline-breeding swamps are only too often created, with a marked increase of the malaria in the locality. One of the resolutions passed dealt with this subject and urged that all such projects should be submitted to the health authorities for consideration before they are sanctioned.

The consensus of the meeting showed very clearly that there is no simple and royal road to the control of malaria; each malarial district is a problem by itself, and what suits one area or one country may be quite unsuitable or impossible for another.

At the afternoon session of the first day—Dec. 5th—Lieut.-Col. C. A. Gill, I.M.S., read a paper on the theory and practice of malaria control; he referred especially to biological methods of control and to the value of forecasting of malaria epidemics. Dr. Strickland's paper dealt with conditions on Ambootia Tea Estate near Kurseong. Here the carrying species was found to be *A. maculatus*, a mosquito which requires clear running streams exposed to sunlight in which to breed. This species was found breeding in the hill-side streams on the estate; these ravines were now planted with jungle, which was allowed to grow. With the growth of this jungle *A. maculatus* disappeared, and with it most of the malaria on the

garden. In this instance a very simple and unorthodox procedure eradicated malaria; the cost was almost nil. Dr. G. C. Ramsay, O.B.E., read a paper on a malaria survey of a group of tea gardens in Assam. It was found that *A. minimus* and the newly discovered *A. ramsayi* were the principal carriers concerned. The latter breeds in grassy tanks, in permanent pools and in swamps with clear standing water in which grass grows. Colonel Katsuno dealt with endemic malaria as met with in Central Japan, and Mr. M. O. T. Iyengar read a paper illustrated by very fine lantern slides dealing with malaria in the lower Bengal delta. The country concerned, he showed, is absolutely flat and consists of two different types; areas with relatively dry soil where temporary accumulations of water during the monsoon form important breeding places for *Anopheles* mosquitoes and where there is much malaria; and areas which are almost perennially flooded, where there is little or no malaria. Large areas of standing water in fact are not the malarial menace to a populace that they are frequently supposed to be, and Calcutta is largely protected by the extensive inundations around the city. On the other hand should *A. ludlowi*—a species which breeds in salt water marshes, and which has been responsible for rendering the Andamans almost uninhabitable on account of malaria—ever get a grip of the environs of Calcutta, it might render the city uninhabitable.

On the second day, December 6th, Colonel James opened the proceedings by reading a paper on the habits of *Anopheles* with reference to their rôle in the spread of malaria. This largely covered the work at the British Ministry of Health which has previously been reviewed in our columns. The process of oviposition, it was pointed out, is dangerous to the adult female mosquito, and in England thus occurs in May and June especially. Towards the end of August there is an almost complete cessation of the maturation of the ova in the female mosquitoes; they survive longer, and their opportunities for infecting persons are therefore much greater. During the winter, with hibernation, the development of the malaria cycle in infected mosquitoes is delayed, but warming such mosquitoes will rapidly render them infective. It is not merely species that are important in malaria transmission, but seasonal factors concerned with such questions as oviposition and the length of life of the adult female mosquito that are important; 100 infected mosquitoes in September may do much more harm than 3,000 in June. Mr. Senior-White then dealt with the biological factors affecting the breeding of mosquito larvæ. He showed that larva-eating fish, though valuable, were not always a suitable measure for malaria control; the pH of the breeding water-supply has a correlation with the successful breeding out of the larvæ, but the correlation is a partial and not a complete one. The chief factor directly correlated with breeding appears to be the ammonia-nitrogen content of the water. As this is largely supplied by organisms of *Nitrobacter* and *Nitrosomonas* type, it may be possible to evolve a bacteriophage against these organisms, and to treat breeding grounds with it. The future of larval control appears to lie along lines of investigation of the biological factors affecting breeding of the larvæ. An exceedingly interesting paper dealing with the feeding habits of anopheline larvæ by Colonel Christophers and Mr. I. M. Puri of the Central Research Institute, Kasauli, was read by the latter author. The breeding grounds tend to become covered with a surface film of bacteria and flagellate protozoa, and the *Anopheles* larva, by virtue of its position at the surface of the water, tends especially to feed on the sub-surface film. Bacteria and algae appear to constitute its chief food supply. This paper was illustrated by splendid photomicrographs showing the larvæ in the act of feeding. Dr. Bruce Mayne then dealt with the possibility of detecting malaria-infected mosquitoes on dissection as an indication of the onset of conditions favourable for the spread of malaria. In the afternoon

papers dealing with the spleen rate in malaria and methods of measuring the enlarged spleen were read by Colonel Christophers, Major Sinton, and Major Covell.

Malaria Treatment.—The third day of the session, December 7th, was devoted to papers dealing with treatment. Colonel James read a paper dealing with the treatment of malaria in mental patients in England induced for therapeutic purposes by the bite of infected mosquitoes. This malaria is far more amenable to quinine therapy than malaria as usually encountered in the tropics. Some of the patients showed a most extraordinary delay—up to nine months or so—in developing malaria after being bitten by infective mosquitoes. Cold and exercise might affect the onset of fever. In such experimentally induced malaria, very short, three or five day courses of quinine treatment were as efficacious as the prolonged ones usually advocated in the tropics. In the discussion which followed this paper, several speakers emphasized that conditions in the tropics, where one rarely saw a case of primary malaria, but was usually called upon to treat relapsing cases, were quite different, and the general opinion appeared to be in favour of prolonged quinine therapy. Major Sinton gave an outline of his well-known work on the treatment of malaria; the administration of alkalies plus quinine appears to control the fever more effectually than any other procedure and to lead to a much smaller percentage of relapses; plasmoquine has its place in the treatment of malaria, but its administration needs to be carefully watched, as it may be toxic. Colonel Acton read a paper by himself and Major R. N. Chopra, I.M.S., on the action of quinine on the malaria parasites: the authors claim that quinine is far more active in an alkaline than in an acid substrate; that quinine in low concentration first paralyzes and then kills the plasmodia. Hence it would appear that its chief action is to paralyze the young parasite forms; these fail to get a grip of the red corpuscles, are swept off into the general blood stream, caught in the capillary plexuses of the spleen, where they disintegrate. The special value of quinine in malignant tertian malaria is due to the fact that, after its administration, the maximal concentration of quinine in the blood stream—in the portal circulation—coincides with the maximal site of multiplication of the parasites. Colonel Froilano de Mello, from Nova Goa, had found Smalarina useless in the treatment of malaria, whilst Dr. K. E. Surkeb, of Pager-Alam, advocated the use of silver-salvarsan intravenously for its special action on the gametocytes of malaria parasites; it is claimed to be safer and more stable in the tropics than neosalvarsan. It is important in general to combine arsenic therapy with quinine in the treatment of malaria.

PLAGUE.

One of the most notable features in connection with the Plague Section of the Congress was the wonderful exhibit by the Haffkine Institute on this subject in the Scientific Exhibition of the Congress; this dealt with the history of plague in Europe and Asia—including many reproductions of quaint and ancient prints, and the methods of preparation of anti-plague vaccine at Parel. The Plague Section of the Congress constituted a special meeting and combined discussion between the F. E. A. T. M., and the League of Nations Plague Sub-committee. Lieut.-Col. F. P. Mackie, O.B.E., I.M.S., dealt with the present position of the plague problem in India and elsewhere. He dealt with the different rodents associated with the epidemic spread of plague in different countries, their different ectoparasites concerned, the climatic factors, and the carrying over of epidemics; with the human factor, the history of plague in India, the value of inoculation against plague, and the possibilities attending the use of bacteriophage. Dr. Wu Lien Teh then gave a history of pneumonic plague in Manchuria and dealt with its epidemiology, pathology, and infectivity; the value of sera and

vaccines was discussed; whilst he also dealt with the perpetuation of plague in wild rodents, and especially in the Siberian marmot in Manchuria. Dr. A. N. Goyle gave an account of his work in the United Provinces; *Xenopsylla cheopis* had proved a better transmitter than *X. astia*, whilst male fleas appeared to transmit better than females. Climatic conditions under which continuous transmission was obtained had also been studied. Khan Bahadur Dr. N. H. Choksy of Bombay then dealt with 'an unrecognised type of plague'—the cellulocutaneous type, associated with local spreading necrosis of tissues. It constitutes about 4 to 6 per cent. of the cases seen, and has a relatively low mortality—recovery rate 37 per cent. as against one of 26 per cent. for the bubonic type.

There was a considerable discussion in the Plague Section, and many speakers took part. The account by Colonel Forster, I.M.S., of the measures taken in trying to extirpate plague in rural villages in the off season, and especially in villages infected late in the plague season, in order to prevent recurrence in the next season was of special interest.

CHOLERA.

The Cholera Section was one of special interest. It was opened by Lieut.-Col. A. J. H. Russell, C.B.E., I.M.S., who gave an account of his statistical enquiries into the epidemiology of cholera in India. He showed how in Madras Presidency there are three different areas, in which conditions are entirely different. Cholera constituted a most serious problem for India. The bulletins issued by the League of Nations indicated that at the present time India was practically the only part of the world in which cholera persisted in epidemic form, and as Bengal had been called "the home of cholera" by most writers during the past 200 years it seemed fitting that that disease should form the subject of a discussion at an international congress in Calcutta.

Continuing, Col. Russell said:—"A review of the historical records makes it evident that the disease known as cholera was familiar to the Hindus, Chinese, Arab, Greek and Roman writers of the pre-Christian era and that in India the cholera of to-day is exactly the same as it was at least 400 years ago and as it probably ever has been." Because of India's position as a source of infection to other countries it has been the unfortunate custom in discussing the epidemiology of cholera to look upon epidemics there as relatively unimportant and to devote the most time and energy to tracing the routes of spread from India to other parts of the world.

It is obvious, he said, that the epidemiology of cholera as it exists in India is the key to the problem, and it is surprising how little attention the epidemiological features of the disease have received in the past, most writers having been content either to ignore the question altogether or make a vain repetition of previously recorded inaccuracies. If the causal factors influencing the periodic outbursts of the disease in this country could be elucidated its spread to other countries would cease altogether, or in any case cease to be of any importance.

Cholera in India is a very familiar and easily recognized disease, and although many cases of diarrhoea are no doubt wrongly included, it has been found that results are not vitiated to any extent by assuming that all deaths registered as cholera are actually such. By using the statistics for different provinces it has been possible, for example, to forecast epidemics of cholera two or three months ahead of the actual outbreaks. It may, therefore, be stated with confidence that the available data are sufficiently accurate for purposes of a comparative epidemiological study and that they may permit of definite inferences being made.

A study of the annual cholera deaths over a long period of years has made it possible to divide the provinces of India into three great groups. The first group includes the provinces of Assam, Bengal, Bihar

and Orissa, and the United Provinces, where more or less uniform figures are registered annually, and where the average incidence is high. These areas are likely to be epidemic in nature. In the second group are included the Central Provinces, Bombay Presidency, the Punjab and the N. W. Frontier Province, where sudden peaks in cholera incidence occur at regular intervals. These areas are nearly free from cholera epidemics, and infection is probably always brought in from outside. The northern and central district groups of the Madras Presidency are epidemic areas, whilst the southern districts group which presents a uniform incidence might almost be included in the first group as an endemic area.

As with other epidemic diseases, cholera spreads widely and rapidly at certain periods, whilst at other times it remains dormant or spreads only sporadically and with difficulty. The regular seasonal appearance of the disease in more or less virulent form is a well-recognized characteristic of its manifestations. It has been found in nearly all the areas where cholera is epidemic, waves of the disease recur once every 5 to 6 years, while in the endemic areas a 4 to 5 years periodicity is most probable. In every case the periodograms show that cholera tends to run a more or less definite course of revival, decline and subsidence in each cycle of years.

It must not be understood, however, that cholera in India adheres to a regular cycle. As Sir Leonard Rogers has stated, the problems associated with the epidemiology of cholera are not so simple as to be explained by the cyclic trend. Koch attempted to explain this periodicity "mainly through the influence of the immunity which follows extensive ravages of the disease." Probably other factors have an equal significance, but whatever influence may be at work, it is certain that a foreknowledge of the probable advent of a periodic wave in the incidence of the disease would go far to prevent waste of efforts in unnecessary directions and at unnecessary seasons. In Madras we have for three years past made use of that knowledge with considerable success.

Proceeding, Col. Russell said: "So long as public health departments confine their attention merely to the eradication of the disease, so long will their efforts end in disappointment. The proposal to protect millions of pilgrims year after year by means of the new cholera vaccine was one that might make the bravest tremble and the boldest public health administrator submit his resignation. Inoculation against cholera is, of course, no new experiment in India, and public health authorities are well acquainted with the prophylactic value of the new cholera vaccine.

"It is obvious in any case that inoculation by itself cannot be expected to eradicate cholera unless extensive sanitary arrangements are made at important towns and trading centres. The provision of pure water supplies, rapid collection and disposal of refuse; the extension of health organisations and staffs; and the immediate notification of outbreaks of the disease are all important essentials which are receiving more and more attention from provincial governments and public health departments.

"In the great task of controlling cholera in India we need the co-operation not merely of the governments in India but of all interested in the welfare of India, and the support of such international bodies such as the League of Nations and the Far Eastern Association of Tropical Medicine will go far to ensure such advance. It ought not to be beyond the skill of man with all the weapons of modern science at his command to devise measures to meet successfully many of the influences at work, and only when these are introduced will it be possible to hope for the control and eventual eradication of this deadly enemy of mankind."

Dr. S. Kiribayashi then gave an account of the epidemics of cholera in Formosa since 1895, and

Dr. E. E. M. H. Jourdan an account of the 1927 outbreak in Tonkin. Lieut.-Col. C. L. Dunn, C.I.E., I.M.S., then gave an account of the very successful measures which he and his assistants adopted against cholera at the great Kumbh Mela fair at Hardwar in the United Provinces in 1927. In all, 90 cases occurred, and every one of them was closely investigated; it was found that the early cases were all imported from Bengal and that the Ganges water was responsible for all. Bacteriological and chemical analyses of the water from a 10-mile stretch of river were made and gross pollution with sullage water from Hardwar was found. Examination of the stools of 1,000 healthy persons and contacts showed a marked increase in the number of persons passing vibrios during the period when cholera increased, whilst flies were also definitely incriminated. Over 10,000 persons were inoculated, and the prophylactic measures advocated are the introduction of underground sewage, chlorination of the most dangerous part of the Ganges, and the use of tap water. Colonel Dunn and his staff are to be congratulated on the splendid way in which they tackled the cholera problem in connection with this great pilgrimage.

Dr. J. W. Tomb, O.N.E., then read a paper on the bacteriology and epidemiology of cholera in the Asansol Mining Settlement. This paper covered much of the ground previously reported by these authors in papers in this journal. The 'open-bowl' method of cultivation of vibrios was described, and the conversion under natural conditions of agglutinating into non-agglutinating strains. The general factors, such as the vibronic content of surface water supplies, the atmospheric absolute humidity and temperature were discussed.

A lively discussion followed. Colonel Forster agreed with Col. Dunn and Col. Russell in desiring a much larger anti-cholera organisation in India, and Col. Graham agreed with them. The League of Nations and all-Europe generally is looking to India to control its cholera problem, as this constitutes a danger to the whole of the world, and epidemics which begin in Bengal may spread as far as the Mississippi.

In the afternoon session Colonel Russell dealt with the results obtained from subcutaneous inoculation of anti-cholera vaccine and from the oral use of bili-vaccine.

He referred to the experiment carried out by the Government of Madras at the suggestion of the Office Internationale d'Hygiène Publique, and said that both the subcutaneous anti-cholera vaccine and the oral bili-vaccine conferred a high degree of immunity. He added that the risk of injury from inoculation was so inappreciable and the discomfort so uncommon that the case in favour of anti-cholera vaccine as a practical and cheap preventive measure was complete.

Bili-vaccine takes the form of tablets which are dissolved in the mouth and serves the same purpose as inoculation against cholera, typhoid and dysentery.

Experts from different parts of India took part in the discussion and narrated their experiences of how suppression of cholera has followed immediately upon the inoculation of an infected community. The consensus of opinion was that anti-cholera vaccine was one of the most valuable preventive measures.

In the course of his paper on anti-cholera inoculation Col. Russell said: For many years past the constantly recurring epidemics of cholera in India have been a matter of grave anxiety not only to the governments of this country, but to other nations of the world. While considerable attention has been given to the study of the epidemiology of cholera and many obscure points have been made clear, effective control of the disease still constitutes an extremely difficult problem, and public health workers in India are only too anxious to utilize every possible means to reduce its incidence.

When, therefore, it was suggested by the Office Internationale d'Hygiène Publique that experiments with Besredka's cholera bili-vaccine should be made in India, the Public Health Commissioner with the

Government of India had no difficulty in arranging for tests to be carried out in several provinces. With financial assistance from the Indian Research Fund Association a comparative field test of the bili-vaccine and the well-known anti-cholera vaccine was commenced in the Madras Presidency in December 1925. After 18 months' work, covering three epidemics, a report was submitted to the League of Nations, Health Section, and to the Office Internationale in July 1927, with a view to early publication of the results.

After referring to the report, Col. Russell continued: "The coefficients of correlation between treatment with vaccines and cholera attacks are uniformly negative and significant, two being as high as 0.52. Protection is therefore conferred by both vaccines, although the coefficients are not so high as those usually obtained for groups of persons protected against small-pox by vaccine lymph. The coefficients for direct contacts are all between -0.28 and -0.52. Treatment with the vaccine has, therefore, conferred a high degree of protection among persons directly exposed to infection.

Remembering the limitations, he concluded, it may be inferred that a high degree of immunity is conferred by both the subcutaneous anti-cholera vaccine and the oral bili-vaccine, but that the former is in the long run superior to the latter. In view of the fact that with the ordinary precautions the risk of injury from inoculation is inappreciable and that even transitory discomfort is uncommon, the case in favour of anti-cholera vaccine as a practical and cheap preventive measure is complete.

An interesting discussion followed in which with the exception of one, all the speakers spoke in favour of anti-cholera inoculation as a valuable preventive measure.

Lieut.-Col. W. C. Ross, I.M.S. (Bihar and Orissa), announced himself as a whole-hearted sceptic of cholera inoculation and referred to certain published and unpublished data of many years ago in support of his contention that cholera vaccine was of no value whatsoever.

Lieut.-Col. McCombie Young, I.M.S., a former Director of Public Health, Assam, said that he introduced the use of anti-cholera vaccine among tea garden emigrants to Assam about 8 or 9 years ago. In a year when cholera was greatly prevalent a quarter of a million persons were inoculated prior to their journey to Assam and the results were exceedingly satisfactory.

Dr. C. A. Bentley, Director of Public Health, Bengal, said it was most refreshing to meet a whole-hearted sceptic like Col. Ross. Nowadays when he met a critic of this sort his first question always was: "Have you ever seen any cholera inoculation; have you ever done any inoculation and have you ever been inoculated yourself?" But he invariably found that such critics could never answer any of these questions in the affirmative.

He had also a confession to make. Not many years ago, before he had seen any inoculation, he would have probably supported Col. Ross on theoretical grounds, but it was impossible to do so now. He remembered having told the head of a large firm in Calcutta when he asked for a supply of cholera vaccine for a tea garden, that inoculation was not the soundest measure to adopt. His views were quite different now, and he had been compelled to change them by the accumulated weight of evidence in favour of inoculation.

Nearly four years ago, continued Dr. Bentley, an outbreak of cholera occurred at Dogachia, a village about 20 miles from Calcutta, where the Bengal Health Association had a volunteer service for the treatment of kala-azar. Medical officers were sent to him for cholera vaccine and a few days later they asked for a further supply because the villagers from five or six villages wished to be inoculated. He was surprised at this request and went out personally to see what was happening and saw an amazing sight. An

unending stream of men, women and children were passing the tables where the volunteer doctors and their helpers were doing inoculation. He also learnt the cause of the phenomenon.

There had been five cases of cholera at the village of Narainpur before inoculation was begun. When the vaccine arrived every man, woman and child in the village was inoculated except two persons, one, a man who refused to take it, and the other, a little girl, who ran away and hid herself. Within twenty-four hours the man who refused inoculation died of cholera, and within three days the little girl, who hid herself, also died of the same disease. This fact speedily spread abroad and led the inhabitants of the neighbouring villages to ask for inoculation.

This story had a sequel. A few months ago, more than three years after the inoculation, Dr. Bentley visited the village, and was told by the villagers that there had not been a single case of cholera in that neighbourhood since the inoculation, although formerly they used to get cholera every year. There was a still further sequel. About a fortnight ago a petition had been received from the villagers stating that after long immunity from cholera owing, as they stated, to the former inoculations, the disease had again appeared, and imploring that arrangements should be made to reinoculate them once more. He was glad to say that the same agency, the Bengal Health Association, undertook this task and within a few days 1,500 people were inoculated with the result that cholera disappeared.

Referring to another instance showing the value of cholera inoculation, Dr. Bentley said last year a village in the district of Rajshahi, inhabited by Hindus and Mohammedans, was attacked with cholera. A doctor was sent there with vaccines and the Hindus readily took inoculation with the result that cholera ceased among them. At this time communal trouble was prevalent and because of this the Mohammedans refused at first to take inoculation from the doctor who was a Hindu. When, however, they saw that the disease had ceased among the Hindus after inoculation, while they were still being attacked, the Mohammedan men took inoculation, but refused it for their womenfolk on account of purdah prejudices. But when the doctor was about to leave the village the Mohammedans changed their minds and implored him to remain and inoculate their women also. The doctor completed the inoculation and the epidemic promptly disappeared.

Instances of this nature which could be multiplied indefinitely had compelled him to change his former attitude of hostility to cholera vaccine, and he now considered that this was the most valuable single method of combating cholera.

Col. de Mello (Goa) referred to the wonderful results which had been achieved by cholera inoculation in Goa. He said that formerly they had never been able to control these epidemics, but now with cholera vaccine they could combat them easily and quickly. The results were so efficacious that the Government had now made cholera inoculation compulsory in the Army, among the police, and for all cholera contacts throughout the country.

Replying, Col. Russell said about 100,000 inoculations had been performed in Madras city within a month, and as far as he was aware, there had not been a single case of death from cholera among the inoculated. The reaction was so trifling as to be negligible.

Referring to his experience in rural areas, he said that about half a million inoculations had been performed during the last three months and the results had been invariably excellent, so much so that he could unhesitatingly state that in his opinion cholera inoculation was one of the most effective means at their disposal for controlling and preventing the disease.

A very interesting paper in the Cholera Section was one by Dr. B. B. Brahmachari, Assistant Director of

Public Health, Bengal, on the relationship of non-agglutinating vibrios to the true *Vibrio cholerae*. In an endemic area 68 non-agglutinating strains of vibrios had been isolated and their properties investigated. On inoculation into rabbits a typical anti-serum against these strains was produced, but, after intravenous passage through the rabbit some of the non-agglutinating strains became transformed into typical *Vibrio cholerae* and showed agglutination to anti-serum of the true Koch's vibrio. Other similar strains on sub-passage on culture media also became transformed into the true Koch's vibrio. Dr. Brahmachari's paper—if his results are confirmed—is one of the very greatest importance in connection with the ætiology of cholera. Many workers have for years tried to prove the conversion of non-agglutinating strains into the true Koch's vibrio, but, whilst previous workers—such as Tomb and Maitra—have succeeded in converting the true Koch's vibrio into a non-agglutinating type, apparently no one has previously seen the converse transformation, of the non-agglutinating strain into the true Koch's vibrio.

KALA-AZAR.*

On Thursday morning, December 8th, the meeting of Section IV was devoted to kala-azar. Col. S. P. James presided and the meeting was opened by Lt.-Col. R. Knowles reading a paper on "The Kala-Azar Transmission Problem and the Factor of Resistance." He commenced by giving a short historical account of the various facts which had led to the suggestion that sandflies transmitted *Leishmania*. Wenyon in 1911 discovered that 6 per cent. of wild sandflies in Aleppo were infected with a natural herpetomonad. In 1914 Mackie discovered a herpetomonad (? *Bodo*) in a number of specimens of *Phlebotomus minutus* in Assam. In 1915 the Sergent brothers, Lemaire and Senevet attempted, but failed, to transmit oriental sore by means of *P. minutus*. In 1919 Acton showed that the distribution of sandfly bites corresponded with the distribution of oriental sores on the human body. In 1921 the Sergent brothers, Parrot, Donatien and Beguet caused an oriental sore in a person living in a non-endemic area by the inoculation of an emulsion of sandflies caught in the endemic area. In 1920 Cerqueira showed that the lesions of espundia followed at the sites of sandfly bites, and in 1922 Aragao found herpetomonads in wild sandflies of the *P. intermedius* species.

In 1922 Napier analysed the season of onset of kala-azar and found that the largest number of cases commenced in the months of November to February. This indicated July to October as the months when fresh infections are most likely to take place. McCombie Young reported similar findings in certain districts in Assam. In 1923 Napier investigated the places of residence of the cases in Calcutta and found that there was an endemic focus of the disease in Ward XIV in Calcutta city; on the other hand he found that in the North of Calcutta numerous cases were imported, but that only very rarely did a fresh case originate from this part of the town. After an extensive epidemiological study of the disease, Napier enumerated 21 cardinal points as being the necessary characteristics of the vector of kala-azar, whatever it was. The *Culicoides* and the sandflies are the only insects that fit in with these 21 cardinal points. In Calcutta only three species of sandfly were found, *P. squamipleuris* which was exceedingly rare, *P. minutus* which was apparently a pure lizard-feeder, and *P. argentipes* which was thus the most likely vector. This species was found in very large numbers in the endemic area during the monsoon. Feeding experiments with laboratory-bred *P. argentipes* on kala-azar patients were

undertaken with almost immediate success. Knowles, Napier and Smith in December 1924, published a paper in which they were able to show that the parasite of kala-azar developed and multiplied in the gut of this sandfly very readily. In the following year this observation was confirmed by the Kala-azar Commission, working in Assam.

From this time onwards rapid progress was made, chiefly as a result of the splendid work of the Kala-azar Commission. The life cycle of the parasite in the fly was worked out by Shortt, Barraud and Craighead; they discovered a wild fly infected in Nature, and proved the infectivity of the flagellate form. They demonstrated a massive infection of the buccal cavity of the fly at the 7th and 8th days. It was thus obvious that *Leishmania* infection in the sandfly behaves very differently from a natural flagellate infection in an insect; this always progresses towards the rectum and is transmitted to another insect by means of the faeces.

Parallel work was carried out by Adler and Theodor in Palestine with the sandfly *P. papatasi* and the *Leishmania* of oriental sore.

In March 1926, the position was very favourable, only one final proof being wanted, namely the actual transmission of the disease from one person to another by means of an infected sandfly. Yet, despite an enormous amount of work by both the Kala-azar Commission in Assam and the workers at the Calcutta School of Tropical Medicine, this final proof has not been forthcoming.

Why? Colonel Knowles said that he believed that the reason was that man—and still more so the experimental animals—instead of being very susceptible to infection by the parasite of kala-azar were actually very resistant to it. Even the Chinese hamster had proved very resistant to infection in India where it does not hibernate.

He reviewed the evidence in favour of this view:—

Epidemiological. The curiously slow mode of spread of even epidemic kala-azar. The association of epidemic kala-azar with lowered vitality or debilitated state of the people. The Nowgong epidemic followed after the Assam earthquake; and the recent recrudescence in Assam followed close after the influenza pandemic.

Clinical. The modes of onset of kala-azar; the frequent commencement of the disease as a true infection with *B. typhosis*, or as a true malaria with malaria parasites in blood films; followed by febrile relapse with *L. donovani* culturable from peripheral blood; the contrast between malaria as a disease of sthenic individuals and kala-azar as a disease of debilitated individuals; the hypoadrenia of kala-azar.

Dermal leishmanoid. There is a marked contrast between it and kala-azar, though both are due to *L. donovani*. The pigmentation of the skin in kala-azar is an indication of adrenal insufficiency.

Experimental.—The very great difficulty and uncertainty of inducing true kala-azar in experimental animals is very marked, even after injection of massive doses of virus. The frequency of transient and symptomless infections in animals: the much greater frequency of failure of infection to take at all.

It has been suggested that in endemic areas mankind may get infected wholesale with *L. donovani*. In the vast majority of persons the parasite may never cause any symptoms at all; several remarkable cases are reported in the literature of very prolonged incubation and latent periods of kala-azar. In some persons with high resistance (probably associated with hyperadrenia) the infection only produces dermal leishmanoid. In a relatively few persons, whose resistance is unduly lowered by high food prices or intercurrent disease, the parasite causes true kala-azar. Hence his belief that to continue feeding hundreds of infected sandflies on healthy volunteers or experimental animals may lead us nowhere. We want a study of the nature of, and the factors underlying, this resistance and to find

* By Dr. L. E. Napier, Kala-Azar Research Worker, Calcutta School of Tropical Medicine.

out how to break it down. Recently attempts had been made in Calcutta along these lines; sub-total thyroidectomy and adrenalectomy have been performed on experimental monkeys.

Before the last and final proof that kala-azar is transmitted by sandflies is afforded, this factor of resistance will probably have to be studied and overcome. This involves team work in a large institution, and the services of a biochemist.

Maigor H. E. Shortt then read a paper on "The Life-History of *Leishmania donovani* in its insect and mammalian hosts."

"The life-history of *Leishmania donovani* can be represented diagrammatically by a figure 8, one circle corresponding to the cycle in the insect, the other to that in the mammal, while the central point of construction, the only point where the two cycles meet, represents the bite of the fly, either at the time of ingesting the parasite from the mammalian blood or of returning it to a fresh mammalian host. The two cycles will be described separately, and the act of biting of the fly, the only point where they met, will then be considered.

Life-cycle in *Phlebotomus argentipes*.

The sandfly at its initial feed ingests Leishman-Donovan bodies (type I) from the peripheral blood of a case of kala-azar.

After twenty-four hours the original compact Leishman-Donovan body has increased considerably in size. The flagellar vacuole is a prominent structure, the cytoplasm stains a deep blue with the Romanowsky stains, and usually contains vacuoles. The flagellum is unformed or rudimentary (type II). A flagellate division forms may be present. All the forms are immobile.

After forty-eight hours the swollen aflagellate forms have become somewhat elongated and have developed flagella, the latter being often in a rudimentary stage. The flagellates are sluggish motile but incapable of active translatory movement. The types of flagellate present are type III, stumpy or rounded flagellates, and type IV, immature or larval forms. Division forms are numerous.

Three days after the fly's feed one finds the first appearance of elongated free-swimming flagellates. These are chiefly of type Vb. Types III and IV, already present on the second day, are greatly increased in numbers, and division forms are much in evidence. A few "rosettes" of flagellates may be present. The free-swimming flagellates show intense activity which would enable them to penetrate to any situation in the gut. The flagellates appear to be distributed indifferently throughout the midgut. The end of the third day marks a definite stage in the life-history since now most of the forms of flagellate present in the later stages have already made their appearance.

From the fourth day onwards there is seen intensely active multiplication resulting in an enormous increase of all the types of flagellate already mentioned. A new factor of importance is also now in evidence. This is a progressive concentration of the flagellates in an anterior direction. From this stage onwards the advance of the infection is directed continuously forwards towards the biting parts.

By the fourth or fifth day the fly will usually have taken its second feed. At this stage it will be convenient to describe the appearance of a heavily infected fly on about the fifth day after its initial feed. If the entire alimentary canal be dissected out the conditions now to be described will be found.

The anterior end of the midgut, especially near the proventricular region, will be found to be swollen out by a solid refringent mass of flagellates. The centre of this mass will appear practically immobile but its periphery posteriorly will exhibit a seething motility. The reason for this is that so closely are

the flagellates packed that only those on the outskirts of the mass have any opportunity to move. A varying number of actively free-swimming elongated flagellates will be in evidence posterior to the main mass. The flagellates near the proventricular region and those near the periphery of the mass more posteriorly will be seen to be attached by their flagellar ends to the walls of the gut. These sessile forms are chiefly of types III and IV and, owing to their cramped situation, are not the source of the seething motility mentioned. This is produced entirely by the forms which are near the periphery of the main mass and so can project into the lumen of the gut. These forms appear to be mainly of type V.

The anterior extremity of the infection at this stage reaches the oesophagus of the fly, but in some cases may extend as far as the posterior expanded portion of the pharynx. In the midgut immediately posterior to the anteriorly placed mass, there are numerous free-swimming elongated flagellates, but these decrease in concentration posteriorly and the posterior half of the midgut and the whole of the hindgut are practically free of flagellates.

From the condition just described, which is that reached by the fifth day after the initial feed, there is a progressive extension anteriorly of the main flagellate mass, until by the eighth or ninth day after the initial feed it has reached the mouth proper of the fly, and the most anteriorly placed flagellates are projecting into the prestomum. The main mass of the flagellates as it progresses anteriorly by growing along the pharyngeal and buccal cavities practically occludes the lumen of the alimentary canal, especially in its narrower portions. The progressing anterior extremity of the main mass has usually located in front of it a few elongated free or semi-detached flagellates, since a free surface always seems to encourage the production of the more elongated forms. The extent and rapidity of the development here described depend to a great extent on the initial number of parasites ingested, the larger the number the sooner the infection of the alimentary canal is complete. An average time table, however, for the anterior portion of the main growth would be as follows:—

Proventricular region, fifth day.

Posterior part of pharynx, sixth day.

Junction of pharynx and buccal cavity, seventh day.

Invasion of buccal cavity, eighth day.

Anterior end of buccal cavity, ninth or tenth day.

Besides the alimentary canal proper the flagellate infection may invade the Malpighian tubules, where flagellates in small numbers may be seen, and the oesophageal diverticulum which may be, and in heavy infections usually is, the seat of a massive growth of flagellates.

Life-cycle in the Mammalian Host.

If a fly which is infected to the extent described in the last section were to feed, it would appear necessary that some at least of the flagellates blocking the alimentary should be extruded before the blood cells could pass up the proboscis. Presuming, then, that this takes place, the sequence of events following the bite of the fly may be described as follows:

The flagellates ejected into the wound are engulfed, probably singly, by endothelial cells derived from the blood capillaries or lymph channels, thus gaining an intracellular habitat.

In the process the flagellate loses its flagellum and its body rounds up into the typical Leishman-Donovan form.

The endothelial cell gains the blood stream and may be carried to any part of the body but the sites of election for its lodgement are in the order given, spleen, liver and bone-marrow.

The intracellular Leishman-Donovan body now commences to divide by binary fission into two individuals.

Multiplication proceeds with the production of four, eight, sixteen individuals up to the capacity of the invaded cell to contain its load of parasites.

A point is finally reached where the endothelial cell can expand no further and is ruptured, releasing the contained Leishman-Donovan bodies.

These are taken up afresh by new endothelial cells of the tissue in which they are lying, and the process is repeated until finally an intense infection of the endothelial tissue of the whole organ may result, accompanied by an increase in size of the organ.

Some of these Leishman-Donovan bodies liberated from the tissue endothelial cells of the organ involved may be taken up by endothelial cells or mononuclear cells of the blood capillaries, thus giving rise to the presence of parasites in the peripheral blood of the mammal.

From the peripheral blood the parasites are again taken up by a sandfly at its feed and the cycle in the insect is repeated.

With regard to the method by which the flagellates in the sandfly are transferred to the mammalian host, if we take the prestomum of the fly as the limit of anterior progression of the flagellates, we find that the latter have still to traverse the whole length of the proboscis in order to gain access to the wound.

It is almost certain that the individual flagellates could not swim along the whole length of the proboscis in a comparatively short time to gain access to the wound. This would imply the presence of a fluid medium to swim in, and a rapid and continuous progression of the flagellates in one direction. In other words the parasite does not possess its flagellum in order to swim into the wound.

As the narrow parts of the alimentary canal of the fly in its head are completely blocked with flagellates, it follows that the blood cells cannot enter until the blocking plug is ejected. This must necessarily take place in an anterior direction where the resistance is least. Therefore the flagellates probably enter the wound in the form of a plug and as the result of an expulsive effort of the fly rather than by any volition on the part of the flagellates.

Dr. C. W. Young from Peking read a paper on kala-azar in China.

He gave a very brief resumé of the work that he and his colleagues had carried out in China during the last four years. He described their early search for a possible rodent carrier and their discovery that the hamster was very susceptible to the infection. One infected hamster has been found in Nature. Many attempts were made to transmit the disease from one infected hamster to an uninfected one by means of bed-bugs and other insects without success. The success of the Indian workers led them to investigate the sandflies of China. Three species were encountered, *Phlebotomus major*, *P. sergenti* and *P. perturbans*; when a number of flies of either of the first two species were fed on an infected hamster a certain percentage became infected with the disease. The third species, however, completely failed to transmit the disease to a previously uninfected hamster by means of the bite of these infected flies. In China they had never infected a sandfly by allowing it to feed on an infected human being suffering from kala-azar.

He said that in China the disease was not a house infection in the way that it appeared to be in India; seldom was more than one case observed in each house. But there are many points in common between the epidemiology of the disease in India and in China; for example, it is confined to low lying areas and to alluvial soil, and is a village disease rather than a town disease.

Dr. Young did not appear to think that the disease was transmitted by a sandfly in China.

The subject of kala-azar transmission was then thrown open to discussion. A number of members

joined in this discussion. Dr. Brug said that numerous cases had been reported from Java but that they were all amongst Indians who had come from one or other of the endemic areas in India; also he observed that sandflies were rare in Java. Colonel Christophers said that it was disappointing that the final proof was so long delayed, but that it was not a time to abandon the sandfly theory; we ought rather to concentrate all our energies on obtaining the final proof that the sandfly is the transmitter. Major Shortt said that there were one or two of the "21 cardinal points" with which he did not agree and he pointed out that *Phlebotomus argentipes* has recently been found in Sanawar, above the 1,500 feet level. Dr. L. E. Napier said with reference to his "21 cardinal points," as Colonel Knowles called them, they were not compiled from an observation of the behaviour of sandflies but from a study of the epidemiology of the disease. Some of them were probably wrong and would have to be modified. It was true that no insect fitted in exactly with the 21 points, but the sandfly, and possibly the *Culicoides*, fitted better than any other insect. He would reply to this criticism "Well, if you know a better insect, go to it." Lieut.-Col. W. C. Ross, I.M.S., thought that there was much too much of this laboratory investigation. The problem would not be solved by looking down a microscope. What was wanted was a much wider view of the subject. No epidemiological work had been done and the present workers on the subject did not appear to have a mind above the sandfly, which incidentally they had so far failed to prove was the transmitter. Now he had been carrying out some epidemiological investigations, and had made some important discoveries; the disease was much more common in Bihar amongst Mohammedans than amongst Hindus. Was it conceivable that a sandfly could distinguish between a Hindu and a Mohammedan? He asked us! But, he said, were the feeding habits of the Hindu the same as that of the Mohammedan? No, the Hindu prepared his own food, whereas the Mohammedan did not do so. Furthermore he, Colonel Ross, had found that the disease was more common amongst the more well-to-do who lived in houses with latrines than amongst the poorer who live in huts and have no latrines. Surely these facts should give some clue as to the means by which the disease is transmitted. Others, including Professor Stephens, Colonel Megaw and Dr. Brahmachari, spoke on the subject. Colonel James then called upon Colonel Knowles to close the discussion.

In rising to close the discussion, Colonel Knowles said that he was sorry to see that the soil contamination theory, which he had thought to be as dead as the Dodo, had had so much support at the meeting. That theory had retarded progress for twenty years. The Assam doctors had always claimed that there was a close association between the spread of kala-azar and soil pollution, and they were right; but the association was not a direct one, but an indirect one through the habits of the sandfly species concerned. Colonel Ross had asked how was a sandfly to discriminate between a Mohammedan and a Hindu. Well, curiously enough the reply was that it could and did so discriminate. (He hoped it had not been infected with the communal virus!) The serological studies of Major Lloyd and Dr. Napier had shown that *P. argentipes* very much preferred feeding on cows to feeding on man. In Northern Calcutta the population were nearly all Hindus, and practically every household kept a cow. *P. argentipes* requires polluted soil in which to breed. In Northern Calcutta the *argentipes* were breeding in the cowsheds; when the adult insects emerged, they took to feeding on cows, and did not bite man. Hence, although fresh infection in the form of patients coming into the city for treatment was continually being imported into Northern Calcutta, the disease did not spread there. The cow protected man in that area. On the other hand, in the endemic area in and around ward 14, the population were chiefly Mohammedans, and Anglo-Indians; these people did not keep cows, and cattle

were scarce. Here the *argentipes*, which swarm in that area, and especially so during the monsoon, breed out in the soil of courtyards contaminated with the droppings of fowls and ducks, which these people keep in large numbers. When the adult insects emerge, there are no cows for them to feed upon; hence they take to feeding on man, and hence kala-azar spreads in that area. Doubtless some such similar explanation could be offered to account for the difference in the prevalence in the disease in the two communities in Bihar. (At this point Colonel Ross interjected the remark that in Bihar Mohammedans also keep cows.)

The suggestion that the epidemiology of the disease has not been studied is entirely unjustifiable. Colonel Ross' observations are interesting, but each one of them has already been made by other workers; the greater prevalence of the disease amongst Mohammedans has been repeatedly noted, but it is not a constant feature of the disease in all areas. The Annual Reports of the Directors of Public Health in Assam and Bengal during the last 20 years have devoted a considerable amount of space to the epidemiology of the disease; Colonel Mackie studied the epidemiology of the disease in Assam many years ago, and recently Dr. Napier has contributed two big epidemiological papers. Colonel Christophers considered very carefully the contamination theory before taking up the sandfly work, but he discarded it. Colonel Ross does not perhaps realise that the sandfly hypothesis owes its origin to epidemiological observations chiefly made in Calcutta.

The position thus is that it is almost certain, but not yet finally proved, that kala-azar is transmitted by the sandfly. It is not easy to see what protective measures can be taken against this insect. In the first place, however, the insect only becomes infective under monsoon conditions, and therefore protective measures can be confined to the months from July to November. The adult insect bites readily at night, also during the daytime in a darkened and quiet room. No mosquito net will protect against it, and a net of sufficiently fine mesh to give protection would be unbearably hot. In the infected areas in Calcutta city the electric fan is the best measure against kala-azar, for sandflies are exceedingly susceptible to draughts, and no *P. argentipes* would bite a person sleeping under a moving fan. Residence on the ground floors in the infected area is dangerous, but the upper storeys are safe for the sandfly does not rise much above the ground floor rooms. The suggestion to keep a cow in one's bedroom as bait for the sandfly is an impracticable one. With regard to fumigation, the work of Pringault has shown that vapourised cresol is most effective against sandflies.

Ultimately, it will probably be found best to try to destroy the sandfly ova and larvæ in the polluted soil in which they breed out by treating it with chemical reagents, rather than to try and take measures against the adult insect. Also it goes without saying that the higher the standard of household and soil cleanliness maintained, the less chance there will be for *P. argentipes* to breed. In Assam the European tea planters are to some extent protected because their bungalows are built on elevated *changs*, and so partially elevated above the sandfly zone.

So far from being hopeless, the kala-azar transmission problem was now almost cleared up. It had taken twenty years of work by some of the best trained investigators in India to solve it, but he felt sure that the end was near.

Dr. B. M. Das Gupta then read a paper on "Experimental transmission of Oriental Sore to laboratory animals." A young guinea-pig and two English mice were inoculated intraperitoneally, subcutaneously and intradermally, respectively, with a 2-weeks old *Leishmania tropica* culture. All these three animals were found to have developed visceral infection when killed and examined 93 days later. In the case of the guinea-pig, a distinct papule appeared at the site of inoculation

21 days after and this persisted, but did not ulcerate, till the animal was killed. Scrapings from the nodule examined from time to time showed scanty streptothrix but no *Leishmania*. The second mouse showed a diffuse induration around the site of injection soon after which disappeared within a week.

Lt.-Colonel H. W. Acton, I.M.S., read a paper by Major R. N. Chopra and himself on "The action of the Pentavalent Compounds of Antimony on the *Leishmania donovani* Parasite."

"During our researches on the action of specific drugs, one of us (R. N. C.) noticed the marked effect that the pentavalent compounds of antimony, especially Urea Stibamine and Amino-stiburea had in causing marked alterations in the volume of the spleen. We considered that this action may in some way account for the better therapeutic results obtained clinically by these two compounds. We decided to investigate how these compounds acted on the parasite and bring about a cure of the disease. We found that *Paramacium caudatum* could live for hours in a solution of 1:100 Urea Stibamine, whilst flagellate cultures of the *Leishmania donovani* could survive for 10 minutes in a 1:25 concentration without being killed, so that their action would appear not to be a direct action. Napier had noticed that a good number of his cases of kala-azar, even after a course of these newer pentavalent compounds were still positive on spleen puncture or culture, and often without any further treatment went on to a permanent cure. They, therefore, stimulated some tissue in the body, and thus brought about a cure, although further treatment was not given to the patient. The so-called immunity that is seen after a course of Bayer's No. 205 against trypanosomiasis appears to be somewhat similar in nature to the effect produced by these compounds of antimony. In the case of Bayer's No. 205 it is considered that the drug stimulates the reticular-endothelial tissue. We will review our clinical and experimental data before we attempt to discuss the action of these compounds. We know that the parasites multiply chiefly in the spleen, liver and bone-marrow and to a lesser extent at other sites, and invade the endothelial cell of the reticular-endothelial tissue in these areas. When they come into the blood stream they may be engulfed by the leucocytes and destroyed by these cells. Muir, Rogers and others have shown that any drug or condition that causes leucocytosis, for example injections of turpentine, an attack of cancerum oris, etc., helps to bring about a cure. In kala-azar the bone-marrow function is depressed, as is evidenced by the marked leucopenia present, viz., 2,000—3,000 leucocytes per c.mm.

We found that these antimony compounds had the following action on the different tissues of the body.

(a) There was a great increase in the volume of the spleen, with very marked rhythmic contractions.

(b) They stimulated the bone-marrow, as the leucocyte count was increased from 2,000—3,000 per c. mm. to 7,000—9,000 per c. mm. after a course of treatment.

(c) Stimulated the function of the adrenal medullary tissue because, (i) we found the drug useful in chloasma (due to hypoadrenia) whether the cause was due to kala-azar or not. (ii) The adrenal content was higher than in normal animals after a course of treatment. (iii) Occlusion of the adrenal vein prevents the contractions of the spleen; and (iv) the results of the adrenalin test in patients before and after treatment. Unfortunately we have as yet not been able to work out the distribution of antimony in the different tissues, nor the rate of its elimination from the body: two important factors that may throw some light on the so-called resistant cases of kala-azar, which may be due to these factors, or to the failure of the tissues to respond to the stimulation by antimony.

We therefore consider that the *Leishmania* parasite of kala-azar is destroyed in the following ways, by (a) Leucocytosis and phagocytosis. Owing to the rhythmic contractions of the spleen many of the heavily

infested endothelial cells burst and set free the parasites. This can be demonstrated clinically—in the use of antimony as a provocative test. The parasites are engulfed by the polymorphonuclear leucocytes and destroyed—such is the fate of some of the parasites.

(b) Diminished cell permeability. The hyperadrenia that is produced causes a marked dilatation of the vessels of the liver and spleen pulp, which means that the rate of diffusion from the tissues is greater than the rate from the vessels—as is shown by an increase in the blood sugar, etc.; this can be shown clinically. Diminished permeability of the cells means that less food is available for the parasites, consequently the rate of reproduction is markedly diminished, and the parasites are slowly starved to death. This is probably the most important factor that brings about cures.

As no members appeared to wish to discuss these two papers the meeting was then closed.

There were a number of interesting papers which had to be taken as read as the time was so short; amongst these were included four papers on the pathology of kala-azar by Drs. Cash and Hu of the Peking Union Medical College. These papers were received after the programme of the meeting had been drawn up.

LEPROSY.

This Section met on Thursday, December 8th, and twelve papers of much interest were read. Dr. E. Muir of the Calcutta School of Tropical Medicine opened the general discussion on the treatment and prevention of leprosy. 'It cannot be claimed as yet,' he stated 'that we have a specific cure for leprosy, in the sense that the salvarsan derivatives are a specific cure for syphilis, but this is no reason for adopting the despondent attitude taken up by many, who declare that leprosy is incurable and refuse to use any remedies against it.

Whenever the treatment of leprosy has been taken up seriously and intelligently, large numbers of patients have lost all active signs of the disease, and year by year the period is lengthening during which they have remained clinically well.

Apart from the personal relief that such patients experience, it must be remembered that through their treatment and clinical recovery we are shutting off in the most effective way the main avenues of infection. If, while practically nothing was being done to stamp out leprosy, the disease was apparently at a standstill, neither increasing nor diminishing, surely the training of medical men in leprosy treatment and the general adoption of the most effective therapeutic measures must lead to marked diminution of its incidence.

It is a poor economy that refuses the half loaf because the whole loaf is not available, and I think that we have certainly got the half loaf in the form of effective treatment, giving good results in the large majority of cases, even though the whole loaf of a specific is still wanting.

The causal organism in leprosy appears to lie halfway between ordinary bacteria and the mycelium producing actinomycetales. In consequence it may be attacked by means of vaccines with the object of causing immunity, and also by means of chemotherapeutic remedies which have the effect of breaking up lepromata and allowing the tissues of the body to destroy the bacilli.

At the same time, as in all other chronic diseases for which a specific is lacking, the condition of the body and its general resistance are of first class importance, and no line of treatment which neglects these factors is likely to be generally effective.

Of chemotherapeutic remedies the most generally adopted are the oils of the *hydnocarpus-chaulmoogra* group, and their preparations. The methods of administering these are many—oral, by inunction, by the

subcutaneous, intramuscular and intravenous routes. After trying out all these we have found the intravenous injection of the sodium salt the most simple and effective, and it certainly is the most popular with patients.

This method of administration which was first adopted by Sir Leonard Rogers was given up because of the blocking of the veins which soon occurred, but a new method by which the patient's blood is mixed with a 2½ per cent. solution of the salt in the syringe before injection has done away with this difficulty. This method of administration is practically painless, a very important matter when it is considered how long patients have to endure treatment.

Another mode of treatment is to inject the pure sterile oil prepared from fresh seeds. When the oil is fresh and carefully prepared it is not painful to any marked degree, and patients stand it well. Both the methods above mentioned are cheap, an advantage which is not inconsiderable, when large numbers of poor patients have to be treated. The ethyl esters, generally given intramuscularly have in our experience been found more painful, but equally effective. They have the comparative disadvantage, in a poor country like India, of being more expensive.

Other drugs used in leprosy are some heavy metals, especially antimony and copper. Much of the benefit observed from their use is probably of the nature of limiting and clearing up reactions, although there are indications that some copper preparations may be very useful in the destruction of the disease.

After describing the effect of other drugs on leprosy, making special reference to potassium iodide, the lecturer said:—

As in all chronic diseases, the general health of the patient must be maintained. The removal of accompanying and predisposing diseases, the regulation of diet, exercise, bowel and other sanitation, favourable hygienic and climatic conditions and, most important of all, a cheerful and hopeful mental outlook are details not one of which can be neglected in the fight against leprosy.

A very important point in the treatment of leprosy is the study of each individual case. Mass treatment will not give the best results. Frequently improvement is rendered impossible by some careless habit or indulgence of the patient and these must be sought out and corrected if possible.

With regard to the prevention of leprosy, while forcible segregation may be effective in certain small isolated areas with a paternal or autocratic government, such a method cannot be applied to India effectively except in a few cases.

Two of the great stumbling-blocks in the way of dealing with leprosy have been its supposed special connection with the anger of the gods and the supposition that it was irremediable. These have driven patients to hide their "taint" as long as possible and have depressed them mentally and physically, thus causing more rapid increase of the disease. The declaration that leprosy is remediable and the placing of the means of remedy within the reach of all by training doctors and organizing treatment centres are likely to be the most effective means of prevention of leprosy in India.

The fact that within 19 days of opening a treatment centre in a rural area in the Bankura district 250 patients suffering from leprosy were attending, and that once such a centre is opened and conducted by a suitable and well trained doctor the patients continue to attend though many of them have to walk 15 or 20 miles is one of the best proofs that could be desired that leprosy is remediable.

For such centres we have found the iodide treatment the most effective and with this are combined small injections of *hydnocarpus* oil which render the

treatment more active and please the patients who are disappointed if they do not get them.

One great advantage of such centres is their co-operative inexpensiveness as compared with the foundation of asylums and colonies and they are a much more effective means of reaching early cases. They also serve as centres of propaganda and demonstrate the dangers of infection and the methods of avoiding it while patients as they recover prove to their associates the remediability of the disease.

Other papers presented at the Leprosy Section were those by Major Labernadie on leprosy in Pondicherry: on the potassium iodide treatment of leprosy by Dr. Muir; on the value of an autolysate of tubercle bacilli in the treatment of leprosy by Lieut.-Col. R. Row, O.B.E.; and an interesting survey of leprosy as it occurs in Travancore by Dr. Raman Tampi. Dr. J. M. Henderson, who has been appointed to work at the Calcutta School of Tropical Medicine under the British Empire Leprosy Relief Association, dealt with the hæmatological aspects of the potassium iodide treatment of leprosy, and showed how marked a leucocytosis is produced by this intensive course of potassium iodide treatment. The rôle of antimony salts and of adrenalin in controlling the reactions produced in the treatment of leprosy by other drugs, or spontaneously, was also the subject of a paper by Dr. Muir.

Tuberculosis, as a subject akin to leprosy, was dealt with in several papers. Sir William Wanless of Miraj stressed the greater prevalence of intestinal tuberculosis in India as compared with Europe, and the great opportunities for surgical treatment of this condition. Dr. A. C. Ukil gave a resumé of his studies of tuberculosis in Bengal: in general it may be stated that children in India are relatively free from tubercular infection and give a negative von Pirquet reaction. Adults, however, are heavily infected, and the type of organism isolated is almost always of human and not bovine type. Females are more frequently infected than males, and social conditions, housing, and the purdah system explain the very great prevalence of pulmonary tuberculosis in Indian cities. The relative incidence of different types of tuberculosis—surgical, bone and gland infection, pulmonary and other types, and the age incidence—was discussed.

The same author also read a paper on the prevention of tuberculosis in India. He said that the problem of tuberculosis had now assumed an international aspect and was very important to India with her land and maritime relations with other countries.

"Asiatic countries are still much less infected than those of Europe and America. As a cause of morbidity and mortality tuberculosis is one of the most important of diseases. The incidence of the toll of leprosy in India is much less in comparison with that of this socio-economic disease. Yet its claims have not attracted the measures of attention it deserves from medical men as well as the State. It will be to the interest of all the countries to co-ordinate their efforts in the anti-tuberculosis campaign."

He suggested that any scheme for combating tuberculosis must consist of directly attacking the contagion by early diagnosis, and spotting out the diseased and isolating them in special hospitals and sanatoria, their after care and the preservation of infants and non-immunised by vaccination, isolation and other methods.

Attention should also be paid towards removing the factors which favoured contagion, namely, raising the standard of living and the hygienic standard of the home by ensuring cleanliness, plentiful supply of fresh air and sunlight. He also suggested the modification of the Factories Act to provide for compulsory health insurance and the enactment of laws for the compulsory health insurance of clerks, menials, teachers, and other classes of workers, and finally the co-ordination between the different anti-tuberculosis organizations.

NUTRITIONAL AND DEFICIENCY DISEASES*

This Section was remarkably popular, the room provided for its meetings proving entirely inadequate for the accommodation of the large numbers who desired to attend.

Lieut.-Col. R. McCarrison, C.I.E., I.M.S., in his opening paper dealt with the minor manifestations of ill health which occurred in human beings who were fed on unsatisfactory diets, as well as with the more pronounced conditions like night blindness, polyneuritis, beriberi, pellagra, scurvy, rickets, sterility, anæmias, gastro-intestinal disorders, stone in the bladder, etc. Among his laboratory fed rats the controls which had a suitable diet showed a mortality of 1 per cent. against 31.4 per cent. among rats kept under similar conditions on faulty diets of various kinds. Pneumonia, gastro-intestinal infections and heart disease were the chief causes of death. It is believed that the same state of affairs occurs in human beings and that such diseases as tuberculosis, leprosy, cholera and malaria take a much heavier toll from those whose diets are insufficient in any respect.

Emphasis was laid on the ill effects of lack of balance in the diets; hyperplastic goitre may result from excess of butter in the food, colloid goitre from excess of lime, stone from excess of oatmeal or white flour. In these cases the addition of counterbalancing substances such as iodine or milk neutralizes the ill effects. The diet of the Sikhs was found to be superior to any synthetic diet which could be devised, in spite of the addition of yeast and cod-liver oil to the artificial diet.

It is believed to be impossible to do harm by excess of vitamins in the diet, provided they are taken in natural food-stuffs, but the amount of vitamins required depends on the size of the animal, the period of life and the composition of its food. Col. McCarrison referred to the interesting work of Smith and others who showed that deficiency of vitamins caused an increased susceptibility to certain toxins.

He also suggested that the disturbance of metabolism which results from vitamin deficiency may give rise to the formation of toxins in the body; this may be the cause of the toxic manifestations which are seen in beriberi.

In beriberi a toxin is at work, but there is a difference of opinion as to whether the poison is ingested or formed by bacterial agency in the intestine or produced by disordered metabolism resulting from avitaminosis. The nature of the toxin does not matter much provided that we recognise the prime importance of a sufficiency of vitamin-B in preventing beriberi.

The newer knowledge of nutrition is regarded by Col. McCarrison as the greatest advance in medical science since the days of Lister and will do for medicine what asepsis has done for surgery.

Colonel McCarrison dealt largely with avian beriberi of pigeons. True beriberi with cardiac enlargement and degeneration, neuritis and œdema, have been produced under experimental conditions in pigeons. It differs from polyneuritis columbarum (rice disease) in the enlargement and degeneration of the heart which accompany the true beriberi state. It is due to an insufficiency in the food of the anti-neuritic fraction of vitamin-B, but not to a complete want of this vitamin. Complete deprivation of vitamin-B causes polyneuritis; it rarely causes true beriberi. Beriberi columbarum is not due to toxic substances contained in deteriorated rice. Results of feeding experiments with diets (a) containing a deficiency only of vitamin-B, and (b) with diets entirely deprived of this vitamin, are entirely different.

Dr. J. P. Bose contributed a preliminary note on the inter-relationship of some of the endocrine glands

* By Lieut.-Col. J. W. D. Megaw, I.M.S.

with sugar metabolism. The work done by Dr. Bose on this subject at the suggestion of Col. Aeton, and especially that with reference to the response given to insulin by rabbits of different colours has already been published; he finds that Himalayan white rabbits are the least susceptible to insulin, while the brown Belgian hares are most susceptible. Further, the response in the blood sugar fall to injections of insulin is correlated with adrenal activity. The action of the thyroid gland in connection with these differences in response to insulin was also studied, and interesting results were obtained.

Major S. S. Sokhey, I.M.S., followed with a paper on the basal metabolic rate for Indians, in which he showed how the figures obtained compare with those for Europeans. Col. McCarrison then read a paper on the effect of manganese on growth. He showed that small quantities of manganese, such as are normally present in whole wheat, cause an increased rate of growth when added to synthetic diets which are complete in all other respects. Large amounts of manganese are inimical to growth. White flour and polished rice are deficient in manganese, and in this defect may be found one of the reasons why they do not constitute satisfactory articles of diet.

Another interesting contribution by Colonel McCarrison was a paper on the relative nutritional values of the different racial diets in India. It was shown that rats fed on diets which imitate those of certain races of India showed great variations in their rate of growth. Judging by this method of biological assay, the best Indian dietary is that of the Sikhs; next, in order, come the diets of Pathans, Malirattas, Goorkhas, Kanarese, Bengalis, and Madrassis; the last named being the worst of all. The various factors which were shown to be important were the available proteins, mineral elements, and vitamins. An association was believed to exist between the distribution of such diseases as leprosy and the nutritive value of the diets used in the various localities of India.

The next paper by Colonel McCarrison was on the effects of faulty food deficient in vitamins on the gastro-intestinal tract. It was shown that the evil results of vitamin deficiency were (i) degenerated changes in the mucous membrane, sometimes amounting to ulceration; (ii) defective digestion and assimilation; (iii) failure of the neuro-muscular control of the bowel; (iv) loss of the lymphoid elements; (v) new growth formation in the stomach, and (vi) increased susceptibility to infection by bacteria and protozoa, e.g., *Entamoeba histolytica*. The clinical manifestations of vitamin deficiency are gastritis, catarrh, dyspepsia, diarrhoea, dysentery, constipation, and gastro-intestinal stasis.

The experimental production and prevention of stone in the bladder was the subject of another paper read by Colonel McCarrison. The author had repeated and extended the experiments of Japanese workers, who were the pioneers in this line of work. The most important and remarkable finding was that the addition of fresh milk to the stone-producing dietaries prevented the formation of stone. If, as may be hoped, it is possible to prevent stone formation in man by the use of fresh milk, a very valuable addition to our knowledge is contained in this discovery by Colonel McCarrison.

The stone in the bladder which was produced in rats had the usual sequelæ, cystitis, dilatation of the ureters, pyelitis, etc.

A paper on the vitamin content of whole rice was next read by Colonel McCarrison, who showed that whole rice is poor in vitamins, and that this poverty is accentuated by parboiling, milling, polishing, and washing. He believes that the frequent occurrence of beriberi among rice-eating peoples is due to the fundamental poverty of the rice grain in vitamins.

New growths in the stomach of deficiently fed rats were then described by Colonel McCarrison. These

were of a papillomatous character, and showed no definite evidences of malignancy. One of the most interesting of Colonel McCarrison's papers was on beriberi columbarum. It is well known that polyneuritis columbarum is usually regarded as being the same disease as beriberi, but as the cardiac changes are totally different in the two diseases, there is little justification for the assumption that the diseases are the same. Colonel McCarrison has now produced a disease in pigeons which has much more right to the name beriberi than the rice disease of the earlier experimenters.

Major Clive Newcomb, I.M.S., in a joint paper with Dr. G. Sankaran of Madras discussed the question of iodine metabolism in the body. They find that when small doses of potassium iodine are given, about 40 per cent. is excreted within twenty-four hours, and 20 per cent. more subsequently.

Dr. B. C. P. Jansen and Dr. W. F. Donath of Java dealt with the prophylaxis and cure of beriberi by vitamin preparations. They advocated the supply of vitamins as part of the diet, instead of buying sources of vitamins separately. In the case of rice they made an exception, as they found that unpolished rice does not keep well, and therefore it is necessary to use polished rice plus an extract of rice polishings. They have prepared an extract of vitamin-B which is very cheap and at the same time pleasant to take.

Colonel McCarrison then read two papers on goitre. In the first he dealt with the lymph-adenoid type of goitre which he regards as a hypertrophic reaction of an insufficient organ. In this there is a preponderance of lymphatic aggregates, and atrophy of the parenchyma. It can be produced experimentally by feeding an animal on a deficient diet and is due to deficiency of vitamin-B. It has no relationship to the iodine content of the diet. The second paper dealt with the endemic goitre of the Himalayas. This is a chronic hypertrophic condition associated with unhygienic conditions. The cause is believed to be the bacterial contamination of the water supply, but iodine deficiency in the intake is a contributory factor, though not the essential cause of the disease.

Major Clive Newcomb discussed the reason for the fondness of wild animals for 'salt-licks': he could find no evidence that the animals needed sodium chloride, calcium, or iodine. The reason for the animals going to the salt-licks needed further investigation.

Lieut.-Col. J. W. D. Megaw, C.I.E., I.M.S., then read a paper on epidemic dropsy and its relationship to the beriberi problem. The clinical manifestations and epidemiology of the two diseases were shown to resemble each other so closely that it is difficult to regard them as two separate diseases. He inclined to the view that epidemic dropsy is one of the diseases which belong to the beriberi group, which probably includes a number of distinct entities. He regards true beriberi as being due to an intoxication or a toxic infection, while the dry form of beriberi which is not associated with cardiac excitation may be caused by deficiency of vitamin-B.

He complained of the tendency on the part of writers on the subject to rest content with giving the name beriberi to the cases of disease which they describe, instead of stating clearly the clinical manifestations which are found. The name beriberi may be applied to different diseases, caused by unrelated agencies. For the practical control of the diseases of the beriberi group he advocated attention not merely to the nutritional qualities of the diet, but also to the question of poisons which may be produced in rice under unfavourable conditions of storage.

A very interesting discussion followed the reading of this paper, in which Dr. Victor Heiser of the Rockefeller Foundation, Colonel Vedder from Manila,

Dr. Bentley, Colonel Sprawson, I.M.S., Dr. Chuni Lal Bose, Major Jolly, I.M.S., and Colonel Gloster, I.M.S., took part. Several of the speakers agreed that further study of beriberi was needed, and that the vitamin-B deficiency view did not explain everything. The nature of the chief criticisms which were made appears from the reply by Colonel Megaw, who apologised for the shortcomings of his paper, owing to the impossibility of covering so wide a subject in the limited time at his disposal.

Replying to Colonel Vedder, who suggested that epidemic dropsy might be closely related to famine oedema, he pointed out that in the latter disease there is bradycardia and polyuria; also that the obvious defects in the diet of the victims of famine oedema made the occurrence of such a disease inevitable, whereas no obvious defect can be found in the diet of persons who suffer from epidemic dropsy. Colonel Vedder also pointed out that a similar toxin had been detected in the rice which had been eaten by persons not suffering from epidemic dropsy. Colonel Megaw replied that Colonel Acton and others had claimed to have isolated this toxin; but even if their findings were not accepted, it became a question of a hypothetical poison which fitted in with the observed facts, against a hypothetical avitaminosis which did not fit in with the known facts, and was extremely unlikely to occur in the diets of the persons concerned. Colonel Vedder asked whether treatment by food extracts had been tried: the reply was that striking success had been obtained by a rice-frec diet containing abundant available proteins, fresh milk being the most suitable diet of all.

Dr. Sahaha had given reasons for believing that epidemic dropsy was communicable from person to person, but Colonel Megaw emphasized that the fact that hundreds of patients had gone to health resorts outside the epidemic area, yet none of them had conveyed the disease to any of the people in these places. Dr. Bentley asked for a detailed account of the diets of the victims for a long period prior to the onset of the disease. Colonel Megaw replied that a detailed analysis of the actual diets which had caused the disease was out of the question, as it was impossible to predict the occurrence of epidemic dropsy; but he said that no difference could be found between the diets of the patients and those of their neighbours. He also asked whether it was conceivable that explosive outbreaks of such a disease could be explained on the avitaminosis theory, especially as many of the persons who were affected had been living on an exceptionally satisfactory diets.

Colonel Sprawson referred to cases in which there was no rice in the diet, but only wheat flour which had been stored. The reply to this was that it is quite conceivable that poisons may also be found in stored wheat flour, but if this occurred it must be very rare; also the possibility of adulteration of wheat flour by rice flour had to be considered. In any case, storage of all food grains and flours ought to be attended to with great care, and far too little attention had been paid to this subject in the past. Colonel Kelsall believed that epidemic dropsy differed essentially from beriberi in being an explosive disease, and also in certain clinical respects, but Colonel Megaw pointed out that epidemic dropsy was not always explosive, while beriberi sometimes was explosive. Some outbreaks of epidemic dropsy differed strikingly from some outbreaks of beriberi, but when all the outbreaks of both diseases were investigated it was impossible to draw the line between the two diseases.

Major Jolly enquired whether the mixing of powdered lime with rice had been found to be effective in preventing the disease. Major Stott referred to this point in his remarks, and related how the prisoners in the Calcutta jails had escaped during the Calcutta outbreak of 1909. Their immunity had been attributed to the use of lime, and to the special care

in the storage of the rice. Dr. Chuni Lal Bose, in criticising the suggestion that poisoned mustard oil might be responsible for epidemic dropsy, produced evidence of the occurrence of the disease among persons who did not use mustard oil. Colonel Megaw accepted this criticism and pointed out that he himself did not believe that mustard oil was responsible, but merely suggested that this was one of the food-stuffs which required attention. Colonel Gloster asked for evidence that any samples of rice could be responsible for epidemic dropsy and beriberi. Colonel Megaw replied that if a sample of rice were responsible, it would usually be impossible to obtain it, as the offending rice would almost always have been consumed by the time that the symptoms appeared and before suspicion was aroused. The evidence pointed to the occurrence of the poison in sharply circumscribed samples of rice, rather than as a widely disseminated poison in the whole supply in a store house.

He expressed regret that neither Colonel Vedder nor Colonel McCarrison had been able to supply any criterion by which it would be possible to place epidemic dropsy in a disease group distinct from the main beriberi group, and he invited them to examine the data on epidemic dropsy which had been collected by his assistants and himself. In conclusion he asked for a broad consideration of the whole epidemic dropsy and beriberi problem as well as for a close examination of details: he believed that the truth might be arrived at by making a wide and comprehensive survey of the question.

PHARMACOLOGY : DRUG ADDICTION.

In this Section, Major Chopra read a very interesting paper summarising his research work of the past six years on Indian indigenous drugs.

"A large number of medicinal plants grow in India and during the last six years a systematic study of these has been undertaken. Firstly, the drugs of known value which are recognised by the British and other Pharmacopœias are being investigated, in order to see whether the standard of active principles of those growing in India is equal to those used in the Pharmacopœias. The allied species of these plants which grow in this country are also being examined in order to see if they can be used in therapeutics in place of the official drugs. A number of drugs belonging to this class have been examined. *Artemisia brevifolia* Wall and *A. maritima* (Linn) grow abundantly in the Northern Himalayas and yield excellent santonin. Good quality of *Digitalis purpurea* grows in Kashmir and in Mungpoo near Darjeeling. *Psychotria ipecacuanha* can be grown in certain parts of the Himalayas, and gives a good yield of emetine. Valerian, hyoscyamus, belladonna, podophyllum, colocynth, colchicum, juniper and many species of aconite grow in different parts of India and are of excellent quality.

Secondly, research has been directed towards the investigation of well known remedies that are used in the indigenous systems of medicine in vogue in this country. These remedies are being gradually analysed, their active principles isolated and their pharmacological actions are being worked out. We are also trying them clinically in order to see whether the claims made regarding their efficacy can be proved or disproved. We have worked out a number of such drugs. *Bærrhavia diffusa* (Punarnava) is a good diuretic; *Vitex peduncularis* and *Berberis aristata* are useless in malaria. *Butca-froudosa* (Polas) and *Serrutula anthelmintica* (Somraj) are good anthelmintics; *Psoralea corylifolia* (Buckchi or Babeli) have given good results in the treatment of leucoderma; *Saussurea lappa* (Kuth root) is a very effective antispasmodic and is an excellent remedy for certain types of asthma and persistent hiccough; the alkaloid conessine from *Holarrhena anti-dysenterica* (Kurchi) promises to be of use in amoebic dysentery; *Sida cardifolia* (Barela)

possesses a very potent alkaloid whose action resembles that of ephedrine."

Major Chopra then read a paper by himself and his colleagues on the pharmacological action of the cinchona alkaloids on the heart and uterus; and this was followed by a joint paper by Major Chopra and Dr. K. S. Grewal on the opium habit in India. This last paper aroused considerable interest.

Stating that the opium habit was of comparatively recent origin, and that it appeared to have come gradually into being after the poppy was introduced into the country by the Mohammedans, Major Chopra said: The policy of the Indian Government in respect of the domestic consumption of opium in India has been criticised. The Indian Government have asserted that it is a matter purely for the British and Indian Governments, and not an international question. The questions we have to consider in answering these criticisms are: Is opium addiction very common in India; is the habit spreading, and is the consumption so great as to be a menace to the health and the morality of the people in general?

Although no statistical data regarding the number of addicts are available, a careful study of the question shows that though the opium habit may have been very prevalent in the 17th and 18th centuries, it never could have been so widely spread and abused as it has been in other Eastern countries. The ravages which it is said to have produced in countries like China and elsewhere have no parallel so far as India is concerned.

Sir William Robert in his minute in the Opium Commission Report says: Taking India as a whole it may be said that a small minority even of the adult male population take opium habitually. That was 32 years ago. We have carefully gone into the matter and have collected statistics from the excise records and from work in the field to gauge the extent of opium consumption in the country at the present time.

We have been forcibly struck by the fact that the opium habit is not nearly so common in India now as might be imagined from some of the recent publications by authors who have interested themselves in this question. Although opium is still administered extensively to infants in many parts, the habit is not widely disseminated among the adult population throughout India. Its incidence among various peoples is very irregular, and although there are certain areas and certain classes of population which are badly affected these form a very small minority.

Our investigations in the Punjab show that in the central districts of that province, which are populated chiefly by Sikhs, the consumption of opium recorded is one of the highest in the whole of India, with the exception perhaps of Assam and Calcutta. The percentage of addicts is about 0.1 per cent. of the total population. In most of the other districts of that province the consumption of opium is up to the standard laid down by the League of Nations as being necessary for medical and scientific purposes, and the number of addicts in these areas is not even 1 in 20,000 to 1 in 25,000.

Referring to the question of doping of infants and children, Major Chopra said: "From a rough general survey of most parts of India that we have made it appears that this custom chiefly prevails at present among the population of areas round large industrial centres, but on the whole the practice is becoming less and less common in the rural areas, and has entirely disappeared in many parts where it existed before. Basing our opinion on our investigations in the Punjab again, we have also been impressed with the fact that the opium habit among the aged is not nearly so prevalent now as it was two or three decades ago.

We have, therefore, come to the conclusion that the opium habit in India is not very common, and is

certainly not spreading. In fact our investigations in the field go to show that during the last fifteen years the addiction has considerably decreased. This is also obvious from the fact that the quantity of excise opium issued for consumption in British India, including Burma, during 1925-26 was roughly 600,748 lbs. as compared with 855,721 lbs. in 1919-20, and 1,031,227 lbs. in 1911-12. The decrease is much more marked in the last few years than in the previous decade.

The factors which have been chiefly instrumental in reducing the consumption of opium in India are the decrease in its production and increase in its price. Some people have advocated a further increase in price so as to make its use prohibitive from the nature of its costliness. As has been rightly pointed out this will only lead to increased smuggling from the Indian States, Persia and Afghanistan, and defeat its own object.

The next question is, what is the effect of the opium habit on the addict? This can only be answered by patient work in the field and observations on a large number of addicts. During the last two years we have been able to study more than 700 addicts both in towns and rural areas. From the data we have collected the Indian addicts are divisible into three main groups. Under the first group come all those persons who resort to the drug because they find it gives them relief from certain diseases or minor ailments, and as many as 30 to 40 per cent. of the addicts in our series came under this category. Though the State is doing all that is possible to increase the facilities for medical aid to the masses, the majority of the population still resort to very primitive methods of treatment and that accounts for opium being used as a household remedy. They do not realize the fact that drugs like opium are merely palliative, but have no curative value. The second group, comprising about 10 to 20 per cent., includes those people who have been working under strain and stress of life unbearable to them, and take the drug to forget their worries and anxieties.

The third group of addicts consists of those who get to taking opium for the purpose of self-gratification, and comprise about 30 to 40 per cent. of the total addicts. These people are generally well off, and start taking the drug for its stimulant action or for the comfort which it affords them. The addicts are generally between the ages of 20 and 35, and this class of addicts is on the increase, both in cities and rural areas, while the others show a decrease. Under this group are also included a large criminal class who often start taking opium under the impression that it fortifies them and enables them to bear the physical and mental strain connected with their nefarious work. Our investigations into facts show that a large percentage of this population are addicted to opium. In all these groups association with the addicts plays a very important part in starting the habit.

Proceeding to discuss the effects of opium habit on health, Major Chopra said: "The addicts who generally show no outward signs of the habit either physical or mental and who consider the habit was not doing them any harm, are those who take small doses not exceeding five grains a day. Most of the other addicts tell you that the habit is doing them harm. They say that they have not the same energy and vigour as they had before, they are unable to do hard physical work for any length of time, and are incapable of mentally concentrating their attention to do any highly intellectual work. Our own experience bears out these facts, and we find that, generally, those addicts who take more than five grains a day become both physically and mentally dull. Their output of work is not equal to that of non-eaters of opium. Small doses, would, therefore, appear to produce apparently little effect, but with larger doses there are obvious signs of deterioration of the general health of the individual.

(To be concluded in our issue for next month.)

Indian Medical Gazette.

MARCH.

THE ADVANCE OF MEDICINE AND MEDICAL EDUCATION.

THOSE of us who can look back thirty or forty years are filled with wonder at the rapid strides which have been made in medical and surgical practice during our lifetimes. Advancing knowledge has simplified many problems but it has brought fresh difficulties in its wake.

On the one hand it is now possible to teach the student how to manage cases of malaria and dysentery and syphilis with a degree of efficiency that was unheard of in our student days, and diseases like kala-azar which used to be approached with sinking of the heart are now dealt with in a spirit of justifiable optimism. On the other hand specialisation has made such advances that the general practitioner finds himself in the unpleasant position of being years behind the standards of efficiency which have been set up both in medicine and surgery. The specialist who can confine himself to a narrow sphere of activity has no difficulty in his own subject, but as far as India is concerned the real specialist is almost non-existent; it is only in the larger centres of population that there is any scope for him. At any rate the specialist is not yet of much importance in India as far as the medical relief of the masses is concerned. It is true that he plays an important part in teaching the general practitioners of the future and in this connection it is essential that he should have a due sense of proportion. He must remember that he is not training the specialists of the future, and if his instruction is based on the assumption that his pupils have nothing to learn except the subject which he teaches, the result will be confusion.

Many of the modern textbooks are seriously at fault in this respect, they are written on the assumption that all the resources of the specialist are at the disposal of their readers. Such books are not of much value to the man whose work lies in an out of the way dispensary.

Operations are described which could be performed only by a Moynihan, and even he would hesitate to operate under the conditions which usually exist in India. It is often assumed that there is one best treatment for each disease, the truth is that there may be several; that which is best in the hands of the expert might be the worst in the hands of the inexperienced surgeon who has the most primitive resources at his disposal. An example near home may make the point clear. Smith's operation for cataract has yielded results which appear to be superior to those obtained by the old-fashioned methods, but which of us

would choose Smith's operation if the only available operator were a surgeon who had only extracted a dozen cataracts? Again, if one of us were suffering from a disease of the gall-bladder or stomach for which the ideal treatment is a delicate operation such as could easily be performed by an expert, would we submit to the operation in the average Indian dispensary?

Obviously there must be two distinct lines of teaching, the one for the specialist of the future, the other for the general practitioner. The same problem exists in other countries, but it is perhaps more acute in India than in Europe and America.

In theory it sounds attractive to aim at having only one grade of practitioner but in practice there is a need for several grades. Under existing conditions we cannot expect to staff all the little dispensaries of India with men who have an elaborate and expensive training, and even if we could, such highly trained men would break their hearts in places where there is no opportunity for the exercise of their great abilities.

At least three grades of practitioners are needed, the specialist, the highly trained general practitioner, and the village doctor. Under existing conditions the specialist can only make a living in the larger centres, but much can be done by encouraging doctors to engage in limited specialisation in places where there are several medical men.

In Bombay and Calcutta there is a great opportunity for specialism, and division of labour, but even in places like these less than one per cent. of the practitioners make any pretence at specialisation so that there is little hope at present for securing a suitable division of labour in smaller places. The real problem in India is whether we are to adopt the principle of turning out large numbers of indifferently trained doctors or of aiming at a high standard of efficiency. Our view is that the interests of the people and of the profession will be best served by maintaining reasonably high standards rather than by flooding the country with poorly trained men. The policy of opening large numbers of medical schools in India should be carefully controlled. What is needed is the complete overhaul of existing institutions with a view to raising the standards of efficiency rather than to follow the ruinous policy of turning out huge numbers of medical men. Fifty years ago it was possible for any young man of good intelligence to master the existing knowledge of medical work; now that medical science has become so vast and complex we are faced with a new situation, and our system of education ought to be remodelled to meet new conditions.

Education has always been in the hands of conservatives, the educated man finds it difficult to imagine that any one can claim to be cultured if he has not pursued the same courses of instruction as were in vogue in his youthful days. Medical education has been less conservative than other branches, but it is tied to the chariot

wheels of the Universities and reforms are made with difficulty. But such obstacles can easily be exaggerated, curricula need not be adhered to in a slavish manner and if the ranks of the teachers and examiners are recruited from men who have breadth of view, neither the restrictions of Universities nor of Medical Councils will interfere with the essential reforms. It is the men who count rather than the machinery of education. But there must be intelligent co-operation between teachers and examiners. It is useless for any teacher to try to train up his students in the essentials of his subject if the examiners insist on asking questions which are intended to display their own erudition.

The medical curriculum is now so vast that it is essential that everything that is unimportant should be scrapped, but it is most disheartening to teacher and students alike if little credit is obtained for a knowledge of important matters and if it is necessary to waste time in the study of subjects which have no bearing on the student's life work.

Beyond everything else what is needed is a sense of proportion; we must keep before our eyes the work which will be done by the practitioners who are being instructed and examined, and we must remember that they have limited powers of assimilating knowledge. Our business is to put first things first, to be quite sure that the essentials have been mastered before we lead our pupils into the attractive higher flights. Speaking with experience, we assert that the existing system of medical education in India fails chiefly because it aims at impossible standards.

J. W. D. M.

TROPICAL NEURASTHENIA.

THIS disease has been much discussed during the past year or two and the question arises whether it is so much more frequent in the tropics as to justify the use of the name "tropical" neurasthenia. The disease is a state of exhaustion of the nervous system, over work, and especially worry being the chief factors in causation. Physical health plays an important part, it is impossible to have a healthy nervous system in a diseased body.

It is obvious that malaria, dysentery, and other tropical diseases will lower the vitality of the nervous system and so make it more liable to exhaustion. Climate itself is a factor; the tone of all the body tissues is lowered by prolonged existence in unfavourable climatic conditions.

Wrong habits of life must be taken into account, alcohol, unsuitable diet, too much or too little exercise, enforced continence and so forth, while life in the tropics has its special dangers which may give rise to a state of conscious or unconscious dread, it has its big and little worries.

Exposure to bright sunlight in the tropics is usually accompanied by exposure to excessive heat, and it becomes difficult to determine the part which bright light plays in damaging the body.

Glare is well known as a cause of headache; probably this is brought about partly by damage to the retina, partly by overstimulation of the visual cortex. It is not likely that the direct action of light rays causes much damage to the body, unless the exposure is excessive. Many persons who live in the tropics protect themselves from the sun to such an extent that they suffer from insufficient light rather than from excess.

Wrong habits of life play their part in causing lowered bodily vitality; alcohol is usually regarded as the friend of the white man in the tropics, too often it is one of the friends from whom we should pray to be saved. Diet is important, partly because it is often difficult to obtain a nutritious fare, partly because animal proteins are often eaten in excess, but the chief error of diet in the tropics is probably the eating of small quantities of tasty food to the exclusion of the more bulky articles which leave a solid residue. Intestinal stasis and intoxication result from this kind of diet. Exercise may be overdone or on the other hand it may be neglected. Some medical men attach importance to the lack of outlet for the sexual impulses, and it is likely that enforced bachelorhood is harmful, though by no means so harmful as unrestrained sexual intercourse. Suggestion plays an important part; life in the tropics is sometimes gay and care free, but on the other hand it is often filled to overflowing with worries and troubles and there are far greater opportunities for introspection than is the case in Europe.

Endocrine insufficiency is emphasised by some, but this is probably rather an after effect of lowered vitality than a cause. All the same it may help in the establishing of a vicious circle and is worthy of attention. Apart from climatic conditions and disease there is probably no factor inherent to the tropics which is of special importance in the causation of neurasthenia and it is doubtful whether we are justified in creating a special clinical entity under the name tropical neurasthenia. Some German writers have described a mental condition which they call "furor

Corrigendum.

Omitted from page 74, February 1928.

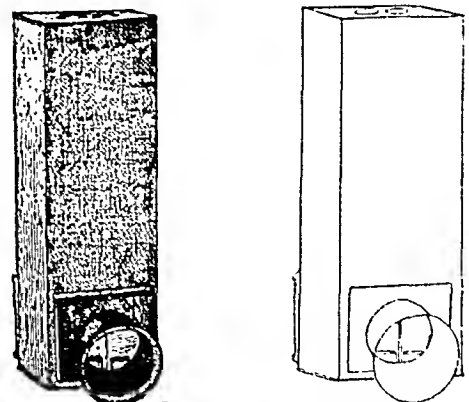


Fig. 1.—Comparator devised by the author.

tropicus" but it is not likely that this would be accepted in a court of law as an excuse for murder or manslaughter.

Each case of neurasthenia in the tropics should be judged on its own merits, and it is likely that in most cases a reformation in the habits of life would bring about a cure just as certainly as in colder countries. When the conditions which give rise to the disease cannot be mended they should be ended by sending the patient on leave to a cheerful and healthy locality, preferably to Europe.

J. W. D. M.

SPECIAL ARTICLE.

GYNÆCOLOGY AND OBSTETRICS, 1927. A PRACTICAL DIGEST.

By V. B. GREEN-ARMYTAGE M.D., F.R.C.P.
(Lond.),

LIEUT.-COL., I.M.S.,
Professor of Gynæcology and Obstetrics, Medical
College, Calcutta, and Surgeon to the Eden
Hospital.

THE past year has not been remarkable for any very important new work in the field of gynæcology, but workers throughout the world by means of "follow-up" systems have been attempting to estimate the end results of operations, and to co-operate as regards treatment.

For instance, Lynch has found that backache was a complaint in 49 per cent. of 1,041 women who were operated upon for lesions of the pelvic organs; in 77 per cent. this pre-operative symptom remained cured. He is of the opinion that backache is chiefly due to pelvic congestion, whereas Schroeder considers that it is due most often to a chronic lymphangitis or to a contraction of the utero-sacral ligaments, or an endocervicitis with erosion.

Fulkerson analysed 1,039 cases of endocervicitis with erosion and discovered that this condition existed in 33 per cent. of all gynæcological patients. Traumatism of labour and abortions appear to be the chief factors, and accounted for 80 per cent. As regards the treatment of erosion and endocervicitis, provided there is no adnexal disease, the electric cautery method of treatment gives by far the best results, especially if further conception is desired.

Sterility, abortions, and difficult labour are frequently reported or complained of after high amputation of the cervix.

Malpositions.

Bullard reports on a study of the results of 361 operations for prolapsus uteri. The Watkins operation was performed on 77 patients with successful results in 96 per cent. and complete failure in 4 per cent. The Mayo operation was performed in 50 cases with a 94 per cent. success. Vaginal hysterectomy was performed for prolapse in 74 cases, with complete success in 78

per cent. There were no deaths and the general consensus of opinion would appear to be that the interposition operation produces the least shock, though when combined with an extensive colporrhaphy, there is the danger of sloughing and *B. coli* infection.

The most striking point about this study and the one most applicable to India, is that 95 per cent. of cases of uterine prolapse can be cured by vaginal plastic surgery, for prolapsus uteri is a hernia through the pelvic floor, and under no circumstances should it be treated by abdominal ventrofixation.

Danforth and Galloway investigated the frequency of retroversion of the uterus in a series of 1,000 private patients. They found that nearly 20 per cent. had this condition during early pregnancy, and the puerperium.

It is necessary to emphasise the fact that over 20 per cent. of women carry their uteri in a retroverted position and that advantage should not be taken of this fact for pelvic engineering.

Malignancy.

The clinical classification of cancer of the cervix is still the best way of making a prognosis. A great number of reports from all over the world have been received which indicate that we are unable to attach any value to the predominating cell type of cancer as a prognostic index.

The question as to whether to operate or not to operate in cases of cancer of the cervix, still agitates the gynæcological world. For instance, Doderlein sums up his experience in 2,300 cases of carcinoma and concludes that radiological treatment is superior to the operative, as it is successful in curing a small portion of even inoperable cases.

Reguad states that radium treatment effects a cure in 15 per cent. to 20 per cent. of cancer of the cervix, regardless of the stage of development of the cancer; in inoperable cases the incidence of cure is from 5 to 10 per cent. while in the operable cases it is from 30 per cent. to 40 per cent. But Heyman of Copenhagen sounds a note of warning and states that the deeper cancer cells are not affected by radium rays, and that these cells proliferate and reduce the chances of success. The writer himself has seen 31 cases with deep parametrial or bony invasion from one to three years after treatment by radium at RANCHI. Ward and Farrar in a critical review and analysis of carcinoma of the cervix, conclude that radium alone is preferable to surgery.

Such being the radiological aspect of the case, it behoves us to look at the other side of the picture in the hands of Mr. Victor Bonny whose superb dexterity and technique is world-famous. He has performed the Wertheim operation for cancer of the cervix in 214 of 340 unselected cases: 34 of the 214 patients died from the operation, 82 died from recurrence, and 85—that is 39.7 per cent.—were free from recurrence after five years. The writer is of the opinion that

operation is the method of choice in properly selected cases, for in spite of the inspired statistics and ambitions of the radiologists the death rate remains without change.

The whole problem of cancer is (1) of prevention, and (2) of early recognition, and until the public, and especially women, recognise and appreciate that cancer in its early stage is operatively curable, the mortality and disability from this disease will continue. It is suggested that just as people go to their dental surgeon for overhaul once in six months, women should after the age of 35 at regular intervals be examined as regards their mammary and genital organs by an expert.

Findlay in an excellent paper on pre-cancerous lesions advocates vigorous education of the laity. He considers a lesion as pre-cancerous when the epithelial cells are enlarged, irregular in size, with hyper-chromatic nuclei and indistinct border outline.

Ectopic Pregnancy.

This condition is frequently missed and much unnecessary suffering results from lack of courage on the part of the medical attendant. The writer wishes to call attention to referred pain in one or other shoulder as a particularly useful symptom where intra-abdominal hæmorrhage has occurred, and the value of puncture of the posterior vaginal wall with a Record syringe needle. In cases of doubt where an urgent diagnosis lies between hæmorrhage and inflammation, repeated taking of the leucocyte count, blood pressure, and hæmoglobin percentage may make diagnosis certain.

A profuse hæmatoma ovarii is the only other condition which can give a similar clinical picture. The treatment is the same in both—laparotomy.

Puerperal Infection.

The recent work of Hofbauer of the Johns Hopkins University on the cellular defence in the parametrium is of great significance.

Metchnikoff pointed out years ago that the polynuclear cells of the blood ingested living bacteria, while the mononuclear cells ingest cell debris, and to a more limited degree the bacteria. He further observed that the mononuclear cells had their origin from fixed tissues of mesoblastic origin. Applying these observations on phagocytosis to the infected uterus, we have long known of a cellular defence in the decidua, the so-called granulation zone composed of polynuclear leucocytes.

In the acute stages of infection the polynuclear cells greatly outnumber the mononuclear cells, whereas in the later stage the mononuclear outnumber the polynuclear. These facts have long been known, but it remained for Hofbauer to demonstrate specific types of cells in the cervix, in the lower uterine segment, and more particularly in the parametrium at the base of the broad ligaments. These cells he classifies as

monocytes and clasmatocytes. They are present as early as the third month of normal pregnancy and increase in number as pregnancy advances.

In the event of prolonged labour or infection the increase in these cell elements is very great. Hofbauer believes that these cells originate from small oval cells which are grouped around the small blood vessels. He has clearly demonstrated that the monocytes and clasmatocytes are phagocytes and belong to the order of fixed cells of the reticulo-endothelial system. They obey the same laws as leucocytes and take up not only bacteria, but also fragments of cells and tissues.

That these cells are of immense importance in the biological defence of the body against puerperal infection there can be no doubt. The researches of Hofbauer have been confirmed by many other workers on the subject of bacteriophages and macrophages, but the only question that remains to be solved is the nature of the stimulant which gives rise to the presence and increasing numbers of these cells.

Many biochemists consider that it is a foreign protein, for it has been observed that the process of resolution of inflammatory deposit in the parametrium and pelvic peritoneum is greatly accelerated or assisted by the injection of such non-specific proteins as milk (which is injected intramuscularly in doses of 5 to 10 c.c. twice a week).

The reaction following these injections is an index of the stimulation of these clasmatocytes and monocytes of the reticulo-endothelial system; but Hofbauer doubts this explanation because the maximum activity of chorionic imporation through the blood-stream is in the early months of pregnancy, whereas the cellular reaction in the parametrium is at its height at the end of pregnancy. He believes that the hormone X, or whatever substance produces the well-known changes in the various organs of the pregnant woman, causes the parametrial phenomena, and that the invasion by bacteria of the parametrium supplies the impetus for the added increase which is seen to such a marked degree in the event of infection. It is possible that such chemical substances as iodine, mercurochrome, quinine, etc., injected into the blood, have their occasional success indirectly by stimulating bacteriophages and macrophages.

Induction of Labour.

In former reviews during the last few years, the writer has stressed the importance of forestalling post-maturity when the size of the baby is obviously large. The various methods of induction, whether at term or before term, have been indicated such as the castor oil-quinine-pituitary (minims 3) technique, the stomach tube, the balloon or bougie method. During the last year, however, Hofbauer and Hoerner of the Johns Hopkins University have published a very interesting paper on the nasal application of pituitary extract for the induction of labour. In 56 cases for conditions such as toxæmia, post-maturity, severe pyelitis and hydramnios, labour

was induced successfully in every instance. Nine failures occurred out of 24 cases where the external os was tightly closed before normal full term.

Technique.

Under direct vision with the aid of a nasal speculum, the nose is gently cleaned of any discharge or crusting. A small pledget of wool is then prepared and moistened with 20 minims of pituitary extract. This is placed snugly and firmly under the anterior end of the inferior turbinate. Within one to five minutes after the application vigorous uterine contractions will occur, and if the original contraction lasts more than four minutes the pledget is withdrawn. In the majority of cases rhythmic labour contractions alternating with periods of relaxation are the normal outcome. Should the pain tend to wear off and labour not to set in within two hours, the first pledget is withdrawn and another put in. In the majority of cases one to three applications of pituitrin on wool are required; in a very few cases as many as five doses are necessary. At the end of one hour, or at most two hours, the pledget is withdrawn and a fresh one applied to the opposite nostril for a similar period of time. Any abnormal condition of the patient such as acute coryza or chronic nasal catarrh, mitigates against absorption of the drug.

The authors' conclusions are that this method is a safe one for the induction of labour or for accelerating labour already in progress. In their series all the babies were born alive, and they conclude by stating that the possibility of withdrawing the drug and thus preventing its further absorption as soon as the uterus passes into tetanic contraction renders the nasal application of pituitary extract the safest method yet available for obstetric purposes.

They emphasise two things: (1) that in any method of inducing labour by means of pituitary extract, the administration of the second dose must not be before the effect of the first dose has worn off; (2) after cleansing the nose, the pledget of wool soaked in pituitrin must be firmly applied to the inferior turbinate bone.

The writer since reading this communication has used it on 7 occasions with complete success.

The "Failed Forceps" case has come into a good deal of prominence during the year, and several papers have demonstrated that these cases are more common than they should be, and indicate that the fundamental principles of midwifery are far from being understood by the general practitioner.

Farquhar Murray reported 52 cases admitted to hospital, the majority of these were cases of contracted pelvis or occipito-posterior position. Despite the fact that expert attention was given after arrival in hospital, it is melancholy to think that out of the 52, eight mothers died and 27 babies were still-born and four more died within a few days of delivery. Such facts forcibly demonstrate that the public is not yet educated to

the benefits of antenatal care and of primary hospital treatment, for it is safe to say that probably all these lives would have been saved had they been attended to in the first place by men or nurses who were efficiently trained.

Shannon has given an equally damning report from Glasgow. If these conditions are possible in the United Kingdom despite preaching and teaching, it makes for greater pessimism in India where countless lives every year are sacrificed through neglect, prejudice and ignorance.

The writer wishes to emphasise again the dire importance of all obstetricians in hospitals in India learning and practising the low Cæsarean section of De Lee. This is an operation of comparative ease, causes very little shock or bleeding, and can be done in India more often than in any other country in the world, for here we see all the contracted pelvis cases late and usually after labour has lasted some hours, when the membranes have ruptured and many examinations have been made. But despite all these deterrents, if the baby is alive the operation can be done with every chance of saving mother and child.

The writer has done a great many since 1925, when he saw De Lee do it in Chicago, and has not lost a mother or child as yet; he looks upon it as an ideal operation for India. When the patient is in labour, it is very easy, for the lower uterine segment is immediately under the parietal incision. The lower segment is always incised transversely, and if infection is certain then a low suprapubic drain is left in. It is remarkable how even the worst cases do well, and what *bien-être* these patients experience as compared with the classical operation. The writer has been urging this method since 1925 (vide *Indian Medical Gazette*, February 1926) and it is consoling to find that even so conservative a place as the Rotunda is now advocating this method in all late cases (vide *British Medical Journal*, November 1927). Surely now the women's hospitals of India will follow suit.

During the last seven years 69 Cæsarean sections have been performed in the Eden Hospital, and 18 in private practice for the following conditions:—

Pelvic Contractions.

Small round pelvis ..	12
Contracted outlet ..	11
Flat pelvis ..	9
Osteomalacia ..	12
Robert's pelvis ..	2
Kyphoscoliosis ..	1
Tuberculosis of the hip ..	1

Malpresentations.

Impacted twins ..	1
Breech and hydrocephalus ..	1

Other Conditions.

Stenosis of cervix or vagina ..	3
Carcinoma of cervix ..	1
Eclampsia ..	8

	Without pelvic abnormality ..	4
	With pelvic abnormality ..	4
Central placenta prævia ..	2	
Adhesions following a former Cæsarean ..	2	
Elderly primipara ..	7	
Pregnancy with fibroid ..	2	
Heart disease ..	2	
Post-maturity (big baby) ..	35	
Pulmonary tuberculosis ..	3	
Pregnancy subsequent to Fothergill operation for prolapse ..	2	
Total ..	87 cases	

If such have been the average incidence and indications for our Cæsarean section during seven years, it will be recognised how all-important it is that the modern technique of the low Cæsarean operation should be mastered by those hospitals in India which are staffed entirely by women.

Considering the fact that during the last two years four cases have been seen of rupture of the scar of a previous Cæsarean section done in another hospital, it will not be out of place to record that Eardley Holland has reported that the incidence of secondary rupture is 4 per cent. Such a rupture may be due to (1) non-apposition of the uterine muscle, with the result that fibrous tissue replaces muscle tissue; (2) infection of the scar, with degeneration of the uterine muscle fibres during the puerperium; (3) the situation of the placenta on the anterior wall of the uterus at the time of the previous operation; (4) the employment of catgut or silk as suture material.

It is interesting to note that in the four cases which were admitted *in extremis* with rupture of the previous Cæsarean scar, that in two the abdominal scar showed obvious signs of having suppurated, and in all the history obtained from the hospital and surgeons concerned was that the suture material used for the uterus was entirely catgut.

In 17 years at the Eden Hospital the writer has never seen or heard of one of our cases ever rupturing, although the number of cases of patients coming to hospital for second and even third Cæsarean section has been very large. The writer attributes this freedom from secondary disaster entirely to the fact that it has been the rule and procedure for over twenty years to use interrupted silkworm-gut through the peritoneum and uterine muscle, but not of course allowing it to traverse the endometrium. The silkworm-gut and the peritoneal scar are finally closed and hidden by a continuous Lembert catgut stitch.

Glucose.

Titus and Dodds have recently stressed the importance of intravenous glucose in many conditions, particularly after severe operations as a preventative of shock, distension, nausea and acidosis. It is of great service in obstetric shock and after Cæsarean section. The authors em-

phasise the fact that anomalous symptoms only occur where there has been faulty technique in the preparation of the solution, and that whereas a 25 per cent. solution is the best to employ, a 10 per cent. solution is the minimum strength which it is wise to use.

The solution can be made from Merck's chemically pure glucose, or better still from ampoules of the drug ready prepared by Martindale. The diluent should be freshly prepared with double distilled water and *not* saline. When ready for use there should be no flakes or particles in the solution. Titus is of the opinion that 200 c.c. of a 25 per cent. solution acts more efficiently and rapidly than a 1,000 c.c. of a 10 per cent. solution. The intravenous injection must be given very slowly, i.e., not more rapidly than 4 c.c. per minute. Insulin may be administered at the same time, and as a general rule 10 to 15 units at the beginning and the same quantity at the end of the intravenous are added.

At the Sixth British Congress of Gynæcologists last year a very spirited discussion arose as to whether operation was the best method of dealing with the *acute pelvis of gonorrhœa*. It was advocated by some that early operation cut short the disease, and that a salpingostomy was a safe and good procedure, in that pregnancy was possible afterwards. My own experience does not bear this out; the necessary drainage, always above and occasionally below, makes convalescence painful and slow, and seeing that many gonococcal infections are mixed with infection due to other organisms, one doubts whether one is justified in running the risk of spreading an infection to the upper abdomen.

Expectant treatment gives uniformly good results in the average case, and there can be few practitioners who have not seen complete resolution after severe pelvic gonorrhœal infections. If in such a case sterility follows, it is more than probable that although nothing is palpable, there may exist only filmy adhesions at the fimbriated end of the tube (the phimotic tube) or that there are mechanical kinks in the length of the tube.

Such conditions can be dealt with at a suitable date by laparotomy, and confirmation as to the patency of the tubes can be demonstrated by insufflation during or before laparotomy. Most authorities at the Congress were in favour of conservatism, that is dealing with the tubovarian condition (if it existed with symptoms) after the subsidence of the acute stage, when the organisms had died and operation was safe.

Solomons has communicated an interesting paper on the subject of *sterility* where the husband is normal and there is a negative Rubin test. He advocates in every such case that the abdomen should be opened and a variety of plastic operations performed on the tube. He divides his cases into three classes:—

(1) Where the adhesions are at the fimbriated end of the tube only. In such the adhesions are

freed and a piece of No. 2 catgut is placed in the lumen of the tube. In 72 cases where this was done, he reports 32 pregnancies.

(2) Where the end of the tube is resected and catgut is inserted as before. Results, 6 pregnancies in 25 patients.

(3) Where the disease is demonstrated at the time of operation to be at the isthmus of the tube. In these the blocked area is resected, and then after bisecting the uterus, a piece of catgut is threaded through the uterine ostium to emerge at the cornu and thence is passed into that portion of the tube that is patent. Results, 15 operations, one uterine pregnancy and two tubal.

These results are too optimistic to be unreservedly accepted. It is difficult to see why the Dublin patients do better than any others; few authorities will agree with his results and many might doubt the accuracy of the original diagnosis.

Placenta prævia has come in for a good deal of discussion during the last year, for there is a growing dissatisfaction with the results of the best clinics. For instance in Edinburgh, during ten years the maternal mortality was 9 per cent. and the foetal 64 per cent; in Glasgow the mortalities were 11 per cent. and 71 per cent. respectively; in New York the mortalities were 7 per cent. and 47 per cent. Such being the statistics it is no wonder that obstetricians are turning away from the older methods, and attempting to reduce the mortalities by newer means. Cæsarean section is the method which is now most advocated but it must be understood that this is not a routine measure; each case must be considered on its merits, but if the child is alive and viable this is an added reason for Cæsarean section.

Watson states that it cannot be too strongly emphasised to the profession that success in dealing with a case of *placenta prævia* depends upon

(1) The immediate hospitalization of the patient at the first hæmorrhage.

(2) The examination of the patient only after the most careful preparation, and when everything is ready and at hand for treatment.

(3) Transfusion of cases before or after treatment is carried out.

If we saw all cases before any treatment was carried out, such as packing or "bagging," a larger number would be found in the Cæsarean class, and as a result there would be an improvement in the respective mortalities. A very large number would perhaps require no other treatment than rupture of the membranes.

Packing, with or without version, is a procedure which greatly increases the mortality, but yet it is the only method at the disposal of the general practitioner far from efficient hospital aid.

Practically all authorities are agreed that the best treatment in a primipara, or if there be a central placenta, or any contraction of the pelvis

is Cæsarean section. Statistics indicate that a quarter of the cases die of antepartum hæmorrhage, a half die of postpartum hæmorrhage, and a quarter of die of sepsis.

It is not sufficiently known that postpartum hæmorrhage is one of the most deadly features of *placenta prævia*. Therefore every means should be taken to forestall such an occurrence. Blood transfusion is the best means; some advocate in addition to the ordinary measures, plugging the uterus or vagina, others tying the uterine arteries.

In choosing to do Cæsarean section the cervix is the determining factor, whatever the age or parity of the patient. The results of Cæsarean section, preferably by the low method of De Lee, are infinitely better than the older ways and means, and it is certain that this operation will become the accepted measure in all cases where the foetus is viable and efficient surgical care is available, for it has reduced the foetal and maternal mortality by one-third.

B. coli infections after obstetric and gynecological operations are so common a feature of the tropics that it may serve a purpose to quote the statistics which the writer has published in previous articles, with a view to helping the patient as well as the surgeon for nothing is more disconcerting than for a patient, shortly after an abdominal operation or confinement, to develop rigors or high fever for which no adequate explanation can be attributed.

In the tropics it is an error of human nature to explain all such adventitious fevers to the ubiquitous *Anopheles* mosquito, and from the point of view of the patient nothing is more disastrous, for she may be dosed or injected with quinine for several days with no effect, and matters made worse because the acid solution tends to increase rather than diminish the severity of the infection.

The writer has proved bacteriologically that 30.2 per cent. of the fevers subsequent to confinement in the tropics are due to *B. coli* infections, and that 10 per cent. of the fevers before delivery are due to the same organism. After plastic vaginal operation, 32.6 per cent. of cases have been shown to possess *B. coli* in the urine: 14 per cent. of all abdominal operation cases also have developed fever due to *coli* bacilluria.

The greatest pains have been taken to investigate the ætiology of these infections: the catheter, though possibly an occasional factor, could only be blamed in less than 5 per cent. of cases, for the greater percentage of the patients had no catheter passed. The infections are just as frequent in Indians as in Europeans; consequently diet can be no causal factor. It occurs in private patients with their own nurses as frequently as in ward cases. The most predisposing cause would seem to be retention of the urine for more than eight hours.

The writer has demonstrated that *B. coli* far outnumber all other organisms in nulliparous and parous vaginae in the tropics, and is frequently

the cause of those most distressing cases of vulvo-vaginitis in children of all classes in India. It is presumed, therefore, that under certain conditions of reduced resistance, these organisms are able to travel via the urethra to the bladder and pelvis of the kidney. Fortunately *coli* bacillæmia is very rare; in only one case, that of double salpingo-oöphorectomy plus hysterectomy for endometriomata, out of 600 consecutive abdominal operations did this occur with a fatal result on the twelfth day.

Every gynæcologist should be on the *qui vive* for this infection in the tropics, and when any untoward fever develops a catheter specimen of the urine should be taken with every precaution. In the absence of an immediate bacteriological report, presumption of this infection may be made if the urine is acid and there is albumin present with pus cells in the deposit. The specific gravity is usually low, and the colour of the urine straw-like with a curious shot-silk like opalescence. Confirmation may be obtained by a blood count, for all *B. coli* patients show a marked leucocytosis. Moreover, despite the high fever, as a rule they do not complain of it or appear to be very ill. Oftentimes the tongue is clean.

Pending a cultural report, the patient should be put on drachm doses of potassium citrate in one pint of barley water five times a day, and a 2 per cent. aqueous solution of iodine (20 to 30 minims) injected intravenously daily. The vagina should be douched four hourly and the bladder washed out daily with a one in ten thousand solution of acriflavine. Urotropin should not be given while the temperature is up, but when it has subsided 15 grains three times a day for a week is useful in preventing a relapse, provided one drachm of acid sodium phosphate is given in water the first thing every morning.

Pregnancy Anæmia.

S. A. McSwiney (*Indian Medical Gazette*, September 1927) records a study of 43 cases of the anæmia of pregnancy, for which no obvious cause, such as malaria or hæmorrhage, could be found. The disease seemingly is much more common in India than in England, and Hindus provided most of the cases. The anæmia was much more frequent in early pregnancies, and there were five times as many patients under the age of 30 as over. As the incidence of twins was more than five times the usual, multiple pregnancy must be considered as a possible predisposing cause. The spleen was palpable in 7 patients, and the liver in 5. In extreme cases the anæmia was profound, and abnormal erythrocytes were seen in the graver cases, while the total leucocyte count showed no striking variations. Albumin was present in 21 cases, and markedly so in 5. Oedema of the feet and puffiness of the face were common, while a general puffiness of the whole body occurred in 14 cases. The patients were markedly prone to miscarriage and premature labour. The labours were noticeably bloodless, and postpartum hæmorrhage was observed in only one case. The author suggests

the following etiological theories: (1) The mother's restorative power to counterbalance the normal destruction of the red cells is inadequate. (2) The destructive action of the chorionic villi on the maternal erythrocytes is excessive, and comparable with the destructive action of the syncytium in chorion carcinoma. (3) Concealed syphilis must be considered, the Wassermann reaction being positive in 40 per cent. of the patients tested.

McSwiney advocates the use of iron and arsenic; plenty of liver, nourishing food, fresh air and sunshine, and whole blood injections. Whole blood transfusion is deprecated as being very dangerous, and weekly intramuscular injections of 15 to 20 c.c. instead are recommended. Specific treatment should be given when the Wassermann reaction is positive. As delivery favours recovery, pregnancy should be terminated, advisably by slow and gentle methods of induction. The patient should also be warned against another pregnancy.

With regard to the above views it should be added that Miss Balfour has proved that this anæmia of pregnancy is of the aplastic type. No absolute evidence has been furnished as to its causation. Miss Mehta has shown that 50 per cent. of cases had *Streptococcus hemolyticus* in the urine, but the incidence of this organism in the urinary tract may be *post hoc* rather than *propter hoc*. The writer's opinion is that the work of Professor James Young most readily meets the problem, for he has proved that the end products of degenerated portions of placenta are the main cause; such products being of the tyramine and histamine group, are absorbed, and give rise to the pregnancy toxæmia. In one group of cases the brunt of the poisoning is on the liver and kidney, in another upon the cerebrum and peripheral nerves, in another upon the uterus and vascular system, giving rise to accidental hæmorrhage, and in another—the one we are considering—upon the hæmopoietic system, causing the classical idiopathic anæmia of pregnancy.

Taking into consideration the facts that this anæmia does not develop or show itself before the fourth month, that it is progressive, that the birth is premature in 90 per cent. of cases, that the foetus is a parasite draining the mother's vitality and very frequently killing her either before or shortly after its birth, despite all treatment including a liver diet and direct blood transfusion, there would seem no scientific justification for the continuance of pregnancy once a correct diagnosis has been made.

Therapeutic abortion having been decided upon, a decision as to the best method is of great moment, for although postpartum hæmorrhage is exceedingly rare in these cases, cardiac failure and shock with or without sepsis are extremely frequent. For years the writer has been advocating courageous realisation and action when dealing with these cases, and he firmly believes that

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in the tropics, when once this disease is established by a full blood report and picture, the best method of emptying the uterus is the application of X-rays to the uterus on three or more occasions. Thereby the foetus dies, and in the course of ten days or so is expelled as a foreign body, or can be facilitated to do so by the application of laminaria tents.

The X-rays should be applied by an expert and serve two purposes, (1) to empty the uterus, and (2) by their effect upon the ovaries, to inhibit the chances of another pregnancy.

The above views have been confirmed and put into practice by several American authorities during the last few years.

With regard to the matter of X-ray therapy to the ovaries by the inexpert, it is necessary to sound a word of warning, for considerable evidence has accumulated during recent years to show that should a patient conceive after X-ray application to the ovaries, there is an extreme likelihood of the foetus being born physically and mentally maldeveloped.

Epilogue.

The writer would like to stress the point how important it is for all teachers and professors in India to keep up to date in the practice of gynaecology and obstetrics, an art which is advancing by leaps and bounds hand in hand with pathology and biochemistry. In India, the morbidity and mortality from conditions which are preventable are enormous. Propaganda and the efficient teaching and training of students and post-graduates is therefore an absolute essential. The *laissez faire*, *kismet*, and "will of God" attitude as regards women's diseases, can no longer be excused by the plea of ignorance.

The great majority of medical students expect to practise medicine, but they are often unfitted for this end by their very training owing to the undue emphasis laid upon laboratory diagnosis and treatment, and the much reduced attention given to the training of their powers of observation. The raising of medical standards should result in attracting a higher grade of men to the profession than formerly, but in my judgment the student body of to-day in India is not of as high a grade as it was ten to fifteen years ago.

The cause of this may be that the fundamental knowledge of English in the modern student is not so great, but it would seem to me more probable that the present system of education is dwarfing instead of developing the average medical student.

There is too much spoon-feeding, with the result that although the student is taught more, he learns less. It has been said that "the medical student of to-day receives an intensive training in the fundamental sciences, a fairly comprehensive course in laboratory medicine, a very minor training of the study of the patient as an individual and not as a test tube, and practically no instruction in the relief of suffering, the ethics, and humanities of medicine." Such a

training is good enough may be to fit a man to do research or to work entirely within a hospital, but it is a very poor training for a man who wishes to enter practice.

This state of affairs can only be remedied by the proper selection of teachers of proved ability, wide interest, and clinical experience outside as well as inside a hospital. The mushroom growth of medical schools in India and the plethora of students in our universities make it all the more important that the teachers of individual subjects should be practical and not only theoretical specialists, for the great function of a medical school should be to train doctors to care for the sick and suffering in the community, on accepted principles of modern science. This cannot be done in India unless the teachers are men of outstanding merit and wide clinical experience, who are able to inspire students by their teaching, practice and example.

Current Topics.

The Indian Psychological Association.

We have been asked to bring to the notice of those of our readers interested in psychology and mental hygiene, the existence of this Society. It was inaugurated in January 1926, with the following objects:

1. The co-ordination in India of psychological research.
2. The publication of psychological works in English and in vernacular languages, and translations from existing foreign works.
3. The publication of a journal.
4. The organisation of lectures and scientific discussions.
5. The standardisation of the curricula in psychology at the different Indian universities.

In its first year the President of the Association was Dr. N. N. Sen Gupta, M.A., Ph.D., University College of Science, Calcutta, and there were 23 foundation members. Since then the Association has slowly made headway in spite of many difficulties and lack of interest. In 1927, the membership roll had increased to 64, the President being Lieut.-Col. O. A. R. Berkeley-Hill, I.M.S., and Secretary Mr. Gopceswar Pal, Ballygunge, Calcutta. In January 1926, the Association commenced to publish a quarterly journal, the *Indian Journal of Psychology*. The numbers of this journal which we have seen are admirably edited and published, and contain papers of considerable merit, as well as abstracts and excerpts from European and American psychological literature. A presidential address by Professor Haridas Bhattacharyya, Dacca University, on "The Psychologist," for example, is an admirable essay on the present-day position in psychology. Other notable articles published are one by Lieut.-Col. Berkeley-Hill on the psychopathic child; one on sex in psycho-analysis by Dr. Girindrasekhar Bose, D.Sc., M.B., of the Calcutta University; and one on sterilization of the unfit by Dr. J. N. Pacheco of Ranchi.

It is stated that there are over three hundred institutions in this country which give lectures and courses of instruction in psychology, yet the position is very unsatisfactory, for the courses of instruction leave very much to be desired. In a few universities, such as those at Calcutta, Lahore and Dacca attempts are being made to put the teaching of psychology on a sound, practical basis, with the introduction of mental laboratory tests, and the like. Yet India surely is a country where the study of psychology should flourish

especially, since it includes so many ethnological races, so much ancient folklore, and so many psychological problems of interest. The Association was largely responsible for the formation of a Section of Psychology in the Indian Science Congress, and its activities are already wide; one of the most recent being a study of the mental status of children in institutions for mentally defective children in Calcutta by means of laboratory mental tests.

We would urge those who are interested in the subjects of psychology and mental hygiene in India to join the Association. The annual subscription is only Rs. 5, which includes the subscription to the quarterly journal. Communications with reference to membership, etc., should be addressed to the Secretary, Indian Psychological Association, Department of Experimental Psychology, 92, Upper Circular Road, Calcutta.

The Royal Institute of Public Health.

We have been asked to bring to the notice of our readers, and especially of those who intend to proceed to the United Kingdom for the purpose of taking a Degree or Diploma in Public Health, the advantages of joining the Royal Institute of Public Health, 37, Russell Square, London, W. C. 1. This institute was founded in 1886, and is under royal patronage. The objects of the institute are to promote the interests of those engaged in official public health work at Home and abroad, or in the public services, and also to aid the theoretical and practical investigation and study of all branches of state medicine (preventive medicine, toxicology, etc.). Its lecture and practical courses are recognised for the Diploma in Public Health examination by the different universities and medical corporations in England, Scotland, and Ireland.

Amongst other privileges of members are the following:—

1. Free delivery of the *Journal of State Medicine*, the official organ of the Institute, monthly. This is an ably run and well edited journal, containing papers of much interest in connection with public health, bacteriology, chemical analysis, etc.
2. Attendance at the Congresses of the Institute. These have hitherto been held annually; the one in 1927, having been held at Ghent, when Lord Burnham gave a very striking presidential address on the housing and slum problem in Great Britain.
3. Attendance at the special courses of lectures given at the Institute.
4. Specially reduced charges for the carrying-out of clinical and other scientific examinations in the bacteriological and chemical laboratories.
5. The use of a large reference library.
6. Facilities for meetings, conferences, etc.

The general course for the degrees and diplomas in public health comprises laboratory instruction; chemistry, with air, water, and food analysis, physics and sanitation; public health administration; fevers, climatology; bacteriology and parasitology; hygiene; hospital administration and clinical practice; and courses of lectures on special subjects.

Particulars with regard to the Institute and its courses of study may be obtained on application to the Secretary at the above address.

The New Year Honours, India, 1928.

THE following were the New Year Honours conferred on January 1st, 1928, on medical workers in India, whose recipients we beg to congratulate.

C.I.E.

Lieut.-Col. C. L. Dunn, I.M.S., Director of Public Health, United Provinces.

Knighthood.

Dr. W. J. Wanless, American Presbyterian Mission Hospital, Miraj, Bombay Presidency.

Kaisar-i-Hind Medal.

Miss E. Griffin, Superintendent, Lady Reading Health School, Delhi. Miss A. S. Graham, Superintendent, Lady Reading Health School, Delhi. Miss E. M. Farrer, Medical Missionary, Bhiwani, Hissar District, Punjab.

Kaisar-i-Hind Medal (Second Class).

Miss E. J. Holdforth, Matron, C. E. Z. M. Female Hospital, Larkana, Sind. Dr. C. D. Esch, Superintendent, Shantipur Leper Asylum, Raipur, C. P. Mother M. Antonietta, Nursing Sister, St. John's Leper Asylum, Mandalay.

Rai Bahadur.

Kishori Lal Chaudhuri, officiating Director of Public Health, U. P. Jai Gopal Mukherji, Reader in Pathology, King George's Medical College, Lucknow. Ram Sarup Srivastav, officiating Civil Surgeon, Bahraich, U. P. Lala Ram Chand, Civil Surgeon, Rohtak. Assistant Surgeon Mukand Lal, House Surgeon, Civil (Dufferin) Hospital, Delhi.

Rai Sahib.

Assistant Surgeon Madan Lal Raikhye, Punjab. Sub-assistant Surgeon Narendra Kumar Motilal, Bihar and Orissa. Sub-assistant Surgeon Amarendra Krishna Ghose, Bihar and Orissa.

Rai Sahib.

Trimbak Raghunath Gunes, Health Officer, Pandharpur, Sholapur. Sakbaram Ganesh Parajpe, Hon. Assistant Surgeon to H. E. the Viceroy. Sub-assistant Surgeon Vishwanath Narayan Shevade, Sutna, Central India. Bhashyani Mudaliar, Assistant Medical Officer, M. and S. M. Railway.

The Paratyphoid Bacilli.

ONE of the most difficult problems in tropical medicine to-day is to determine the pathogenicity or otherwise of the numerous types of bacteria, which—though not belonging to the classical strains of the dysentery bacilli—are yet frequently isolated from the stools of patients suffering from dysentery, and which appear to be either truly causative of dysentery, or else associated with it. Some of these organisms, indeed, may either be lactose-fermenters, or late lactose-fermenters, giving red colonies on a plate of McConkey medium in 48 hours.

Sir Aldo Castellani—(as he now is, since his recent knighthood in the New Year Honours, 1928, in the United Kingdom)—has always been a pioneer worker in this difficult line of investigation, and a paper by him dealing with the whole subject in the *American Journal of Tropical Medicine*, Vol. VII, No. 4, July 1927, p. 199, is well worth the study of all laboratory workers in the tropics.

Sir Aldo Castellani proposes to divide the whole group of the dysentery bacilli and allied organisms into three primary groups, associated with three different clinical conditions, as follows:—

1. *Bacillary dysentery, sensu strictu*;—synonyms Shiga dysentery, Shiga-Kruse dysentery; due to dysentery bacilli which do not ferment lactose or mannite, and do not clot milk;—the Shiga-Kruse group.

2. *Paratyphoid*, due to organisms which do not ferment lactose, cause acidity (only) in mannite, and do not clot milk;—the Flexner-Hiss-Russell group.

3. *Metatyphoid*, due to organisms which do not produce gas in any sugar, but may cause acidity in lactose and clot milk, or ferment lactose with the production of acidity only without clotting milk, or clot milk without fermenting lactose. These organisms he proposes to relegate to the genera *Dysenteroides* and *Laukoides*.

In general litmus milk, lactose, and glucose are regarded as the three essential media by which differentiation of species and genera can be established, and no less than eleven different genera are established by the use of these media. A very important point which

Sir Aldo Castellani's researches have brought to light is that, whereas a single species of organism may produce no gas in any sugar medium, when two such non-gas producing organisms are grown in culture symbiotically in the sugar medium, gas may be produced. This phenomenon he proposes to call the symbiotic phenomenon, and he gives the following general account of it:

The symbiotic fermentation phenomenon has been described by me in previous publications. It may be defined as follows:—

"Two organisms, neither of which alone produces gas in certain carbohydrates, may do so when living in symbiosis or artificially mixed." For instance *B. typhosus* alone does not produce gas in maltose (acid only), *B. morgani* does not produce gas in that sugar (neither acid nor gas); the mixture *B. typhosus* + *B. morgani* produces gas. The phenomenon as I have shown in other publications may be of assistance in the classification of certain bacteria. The more important dysentery bacilli of the genus *Shigella*, may be differentiated as follows: The symbiosis *B. dysenteriae* Shiga-Kruse + *B. morgani* produces gas in maltose but not in mannitol; the symbiosis *B. paradysenteriae* var. *Flexneri* + *B. morgani* produces gas in maltose and mannitol; the symbiosis *B. paradysenteriae* var. *Hissi-Russelli* + *B. morgani* produces gas in mannitol but

TABLE.

Differentiation between *B. dysenteriae* Shiga-Kruse, *B. paradysenteriae* Collins var. *Flexneri*, *B. paradysenteriae* Collins var. *Hissi-Russelli*, by means of the symbiotic fermentation with *B. morgani*.

	Mannitol.	Maltose.
Symbiosis Shiga-Kruse + Morgani	0	G
Symbiosis Flexner + Morgani ..	G	G
Symbiosis Hissi-Russell + Morgani ..	G	0

0 = absence of gas; G = gas present.

not in maltose. The results of the symbiotic fermentation correspond to the results of the simple fermentation induced by the organisms themselves, viz., by symbiotic fermentation, gas is found in those carbohydrates in which the dysentery organisms alone produce simple acidity. The presence of gas, however, is a much more striking phenomenon and moreover, in certain cases, for instance, in the case of Shiga-Kruse with regard to maltose, gas becomes evident much more rapidly than acidity to litmus. With regard to the symbiotic fermentation phenomenon the reader may find all the details in previous publications, among which the papers in the *Journal of the American Medical Association* (February 20, 1926, vol. 86, pp. 523—527) and in the *Proceedings of the Society of Experimental Biology and Medicine* (1926, XXIII, pp. 481—488 and 1927, March, XXIV, p. 511).

In his final summary, the author writes as follows:—

Conclusions.

1. The dysentery bacilli may be conveniently grouped as follows:

- (a) *Dysentery bacilli, sensu stricto.*
- (b) *Paradysentery bacilli.*
- (c) *Metadysentery bacilli.*

The three groups have a very important characteristic in common: they produce no gas in any sugar. The first two groups are biochemically much more closely allied among each other than with the third group. The organisms of the first two groups never produce acidity in lactose and never clot milk; they differ, as well known, among themselves with regard

to mannitol: those of the first group (Shiga-Kruse) do not produce acidity in mannitol, those of the second (Flexner-Hiss-Russell) do. The organisms of the third group on the other hand either produce acidity in lactose and clot milk, or produce acidity in lactose without clotting milk, or clot milk without producing distinct acidity in lactose. The first two groups form the genus *Shigella*; the organisms of the third group form the genus *Lankoides* (milk clotted, lactose acid or no change), and the genus *Dysenteroides* (milk not clotted, lactose acid). The two genera *Lankoides* and *Dysenteroides* are very closely allied, and often organisms which at first are placed in the genus *Dysenteroides* have later to be placed in the genus *Lankoides*, as after a prolonged incubation they produce clotting of milk; it might therefore be advisable to combine these two genera into one genus, *Dysenteroides sensu lato*. The principal pathogenic species of the third group seem to be *B. ceylonensis* B, *B. ceylonensis* A and *B. metadysentericus*.

2. A somewhat similar nomenclature may be used to indicate the various types of bacterial dysentery.

- (a) *Bacterial dysentery sensu stricto*, due to *B. dysenteriae* Shiga-Kruse.
- (b) *Paradysentery*, due to the different varieties of *B. paradysenteriae*, due to the different varieties of *B. paradysenteriae* Collins (var. *Flexneri*, var. *Hissi-Russelli*, etc.).
- (c) *Metadysentery*, due to the metadysentery bacilli (Bacilli of genus *Lankoides* and *Dysenteroides*).

3. Certain authorities believe that the metadysentery bacilli, viz., bacilli of the *Lankoides-dysenteroides* group, may be identified with *B. coli anarogenes*, a bacillus which Lembke isolated from the stool of a dog in 1896; and Nabarro, who has carried out a very important investigation on the subject, is inclined to favour the opinion that the organisms isolated by me and later on by himself, Sonne and others are in fact identical with that bacillus.

I am inclined not to agree with this opinion, as since 1905 I have found constant differences between the principal species of the group, especially with regard to indol production and serological reactions. Some species of the metadysentery bacilli are pathogenic, others are not. Among the pathogenic ones are *B. ceylonensis* A, *B. ceylonensis* B, *B. metadysentericus*. These bacilli in addition to having been found in cases of typical dysentery have been found also in certain obscure types of colitis with or without fever in which dysenteric symptoms were absent.

India and the League of Nations.

(A lecture given by Colonel J. D. Graham, C.R.E., I.M.S., Public Health Commissioner with the Government of India, to the Rotary Club, Calcutta, on the 6th December, 1927.)

From the *Statesman*, 7th December, 1927.

Col. Graham, after remarking that India's birth rate for 1925 was nearly twice that of England and Wales, her death rate was twice that of England and Wales and nearly three times that of New Zealand, her infantile mortality rate was nearly 2-1/3 times that of England and Wales and nearly 4½ times that of New Zealand, said that the information furnished for the great group of infectious diseases of world import, namely, plague, cholera, smallpox, yellow fever, typhus, malaria and dysentery showed that if they excepted typhus and yellow fever, India was one of the world reservoirs of infection and the main reservoir of infection for plague and cholera.

The significance of these facts must be obvious to all. Briefly their implication was that India's house from the public health point of view was sadly out of order, and that this disorder required to be attended to. Till recently this seemed a matter which concerned India alone and it was largely in this spirit that this question was regarded in India. With the re-awakening

of interest in all social problems and the increased international activity regarding public health, and the prevention of disease which occurred after the Great War, it was evident that much in the realm of national disease which formerly passed unnoticed must now come into the limelight and be subjected to international scrutiny.

It was not enough for India to say that she was concerned with 300 millions of her own subjects and had no time to worry over the activities of other nations. She must be prepared to recognize that, in virtue of her important commercial position, she was an international offender—and a dangerous one as well—and in this spirit to set about tackling the problem which confronted her by employing an organisation capable of utilising for such purposes the most recent discoveries of research in regard to these diseases and disease problems which were peculiarly her own.

After dealing with early developments in the realm of protection from diseases, Col. Graham referred to the organisation of the League of Nations and more especially to that section of it dealing with health, and said that of special interest to India was the fact that their Public Health Commissioner was not only a member of the Permanent Committee of the Paris Bureau, but, since December 1926, had also been one of the 20 members of the Health Committee of the League, the President of which they had here in the person of Dr. Madsen of Copenhagen. Great Britain, the Dominions, the Colonies and the Indian Empire were represented by two members, of whom Sir George Buchanan of the Ministry of Health was the other.

What would perhaps appeal more directly to this meeting, however, were the activities surrounding the creation of the Epidemiological Bureau in Singapore. The present position was that 137 ports of Asia, Australia and the East Coast of Africa were now sending weekly information to the Bureau, all of which was incorporated in the broadcast coded message sent out from Singapore. In addition the powerful German apparatus at Mauern which picked up the Saigon message and rebroadcasted it for the benefit of Europe, so that by Saturday of each week the infectious disease condition of 137 ports of the East up to the previous Saturday midnight was known everywhere in Europe, Asia and Africa.

It was, added Col. Graham, almost a platitude to state that much of the economic loss and human suffering going on in India to-day was avoidable. Experience, not only throughout the British Empire but also in other countries had demonstrated this. With such an array of examples it was not for India to say that so far as she was concerned prevention was impossible. It was becoming increasingly evident that a section of the Indian community was thinking seriously on these public health problems. Amidst much futile and destructive criticism of State and municipal effort here and there valuable and suggestive constructive criticisms could be met with, which went to prove his contention.

A well-informed Press, both European and vernacular, but especially the latter, would be one of their most powerful allies in this great fight; for fight it must be, even to waging war and carrying it right into the enemy's camp. This was a work which had to be done for the benefit of Indians. To be effective it must carry conviction and establish its position against immemorial conservatism and tradition; it must therefore be done by Indians. It presented a grand and unlimited field for Indian public health workers, be they male or female; but it was well to recognize that the improvements could not be achieved when the expert labourers were few in number, that these could not be increased to the requisite number without a careful system of specialized training institutes or schools devoted to public health teaching and research, and that this could not be done without adequate financial support.

Col. Graham looked at the entry of the League into public health matters as an innovation which must bear fruit and do good. It would help to break down

more, rapidly many barriers which had little to recommend them, and, whilst bringing home to India what other countries were doing and had done, it would incidentally enable Indians to realize the leeway which had to be made up. They would realize how European death rates had come tumbling down, and how general mortality rates had fallen; they would ponder over the fact that, in 1885, the expectancy of life, in the United States of America was 40 years whilst now it was 58; they may be tempted to probe further into the reasons for this and into the story of the work of voluntary organisations. In this way it was hoped that many Indians might rise who would help to form and lead public opinion in these matters.

In conclusion Col. Graham said that a few years ago India might have been excused for delinquency in international matters, but a time had arrived when India, through her obligations to the League of Nations Assembly and through her commerce, was now called upon to take her position as one amongst the comity of nations. If she would do so creditably in so far as public health was concerned, she must be prepared not only to receive information but to give it, not only to demonstrate her institutions and her organisation to inquirers from outside but to make a serious attempt to establish a public health conscience and to act on it. It was only thus that she would gain that confidence of others which was so necessary for her both commercially and hygienically.

A short discussion followed, in which several of the delegates attending the Eastern Tropical Conference took part.

The Tobacco Habit.

By W. E. DIXON, M.D., F.R.S.

(*British Med. Jour.*, October 22, 1927, p. 719.)

Europe learned the use of tobacco from the American Indians. Tobacco is an Indian word, but nicotine is named after the French Ambassador in Lisbon, Jean Nicot: he grew tobacco seed in his garden, and vaunted the leaves as a cure for all external diseases.

Tobacco was brought into England by Ralph Lane in 1586.

A reaction against its use arose in the fifteenth and sixteenth centuries. James I published in 1603 a pamphlet entitled "*Misocapnus seu de abusu Tabaci Lusitaniae reginus*."

The Tsar Michael punished his soldiers with the rack and knout for smoking.

The use of tobacco has become universal throughout the world.

The smoke emitted from any smouldering vegetable matter, including tobacco, contains ammonia gas and pyridine or pyridine derivatives. These are responsible for the morning cough, the irritation of the throat and tongue, and the conjunctivitis of the cigarette smoker.

In tobacco smoking the only serious effect of these bodies is the local irritation, since their specific effects are insignificant in comparison with those of other substances which are present in this smoke.

The United States Bureau of Mines found that the CO concentration of the air of a room did not rise to more than 0.01 per cent., and the maximum blood saturation of the subjects exposed to this atmosphere was only 5 per cent. Nevertheless this is more than enough seriously to affect sensitive people. Cigarette smoke yields from 0.5 to 1 per cent.; the pipe 1 per cent. or more, and the cigar 6 to 8 per cent.

Tobacco smoke reaches the mouth freely diluted with air, and the amount of CO absorbed from the buccal cavity is negligible, so that pipe and cigar smokers who do not inhale have little to fear from this poison. Cigarette smokers who inhale would absorb a large proportion of the CO which reaches the lungs, since the affinity of CO for blood is more than two hundred times that of oxygen. Hartridge

found 6 per cent. CO in the blood in one cigarette smoker who was by no means excessive in his habits. By far the most important constituent of tobacco is the volatile alkaloid nicotine.

During the slow combustion of a cigar as in ordinary smoking there is an area immediately behind the point of combustion in which the water and other volatile substances condense. During aspiration the hot gases are drawn through this hot moist area and carry with them the volatile principles, of which nicotine is the most important. Hence the smaller this moist area behind the point of combustion—which means, the cooler the smoke or the more complete the combustion—the less likely is the smoke to contain volatile toxic bodies. It follows that a cigarette or slender cigar which is well cooled will yield fewer of these products than a thick cigar, and many smokers can testify that a fat cigar has a much greater effect than a long slender cigar of similar tobacco. This also explains the unpleasant effects of relighting a half-finished cigar or pipe.

Tobacco may contain anything from 1 to 8 per cent. of nicotine; Havana tobacco has about 1.5 per cent.; Maryland 2 per cent.; Virginia 6 per cent.; Kentucky 8 per cent.

The amount of nicotine in tobacco is no criterion of the amount in its smoke. For example, mild honeydew contains only 1.6 per cent.; whilst Cavendish may contain as much as 3.8 per cent.; if these two are smoked under identical conditions the Cavendish naturally yields the larger amount of nicotine in the smoke. But Cavendish smoked in a cool pipe or one provided with a filter will affect the smoker less than the honeydew smoked in a hot pipe. In the churchwarden pipe the opportunity for the nicotine to condense is such that the smoke is almost freed from the alkaloid; and in cigar and cigarette smoking the degree of moisture, the tightness of packing, and the thickness of the cigar or cigarette are the most important factors in determining the amount of nicotine which will be present in the smoke. Habermann and Ehrenfeld state that two-thirds of the nicotine of some kinds of cigars passes over in the smoke; if a cigarette smoker were to puff ten cigarettes on end he would certainly absorb 20 to 30 mg. of nicotine—enough to produce a profound physiological effect, though, administered in this way, perhaps ten to fifteen times under the lethal dose. The amount of nicotine in pipe and cigar smoking is much higher. In our experiments cigar smoke contains about twice as much nicotine as cigarette smoke.

Nicotine is one of the most fatal and rapid poisons known; it acts as quickly as prussic acid, and two drops placed on the tongue of a dog will kill it almost immediately. The lethal dose for a man is 60 to 120 mg. The nicotine present in one cigar if injected intravenously would represent two fatal doses to man. It is therefore somewhat remarkable that fatal nicotine poisoning is not more common. Nevertheless the careless use of tobacco infusions in enemas, the occasional swallowing of tobacco leaves, or even carrying tobacco leaves next to the skin for smuggling purposes, have all led to fatal results.

Various methods have been adopted to eliminate the nicotine from the smoke and the juice which is apt to form in pipes. A porous substance may be put into the stem of the pipe; the space for cooling and condensation may be increased, or some substance which facilitates oxidation may be placed in the bowl of the pipe. These last pipes are called catalytic, and the bowls are lined with some metallic oxide, like that of platinum, in a fine state of division. By passing tobacco smoke over the catalyser formol is formed and the nicotine and pyridine derivatives are decomposed. These pipes have not, however, found favour.

Improved methods of removing nicotine are now being experimented with abroad. Boxes of cigarettes and tobaccos in various forms are treated with superheated steam; by this means practically the whole of the nicotine is said to be removed and the tobacco is

left nicotine-free; the nicotine has a ready sale for agricultural purposes. I have had no opportunity, however, of experimenting with these products.

Continuous smoking for several years not infrequently produces signs of chronic irritation in the mouth, throat, and larynx—sore tongue, morning cough, hoarseness, tonsillitis, or chronic bronchitis, these effects are most marked in the cigarette inhaler. When the smoke is concentrated on one portion of the tongue for many years, which may occur especially in pipe smoking, this constant irritation is said to favour the formation of epithelioma of the lip and tongue if the quantity consumed is large or the smoker predisposed.

Smoking is reputed amongst the public to have an antiseptic action, and is sometimes indulged in nominally for this purpose. Puntoni and others have shown that tobacco smoke has a strong disinfectant action *in vitro*. When the smoke is drawn into the mouth, however, the action is attenuated by the saliva and mucosa, and its antiseptic effect is negligible.

Smoking is indulged in by man because of its sedative action, and this is due solely to nicotine absorption. Nicotine stimulates all nerve cells throughout the body without exerting any kind of selective action.

The commonest symptoms of smoking are loss of appetite and chronic intestinal catarrh. The smoker's lack of appetite, Sir Humphry Rolleston thinks, is not altogether an evil, since it limits the consumption of unnecessary food. Nicotine, and tobacco smoking, by stimulating the autonomic ganglia, increase the secretion of the alimentary glands, and later, after the smoking has ceased, depress them; hence the salivation during smoking and the dry mouth the following day. It is well recognized that in certain persons excessive smoking leads to gastric hypersecretion; hyperacidity is the most common disturbance, and gastritis acida is one of the most frequent results. Hurst believes that tobacco smoking is one of the most frequent causes of hyperchlorhydria.

On the musculature of the alimentary canal the action of tobacco is equally well marked, the automatic movements are first inhibited and later augmented, as a result of stimulation and later depression of the autonomic nervous system.

The mild laxative action of tobacco smoke may be explained by the ultimate depression of the inhibitory cells whereby the motor nerves assume an undue influence on the automatic movements.

Hunger is due to certain well recognized automatic contractions of the stomach; smoking definitely inhibits these. All observers are agreed that the use of tobacco increases the pulse rate from five to ten beats a minute, and in the case of the man who is continually smoking the increase of rate becomes permanent, but this condition produces no apparent disadvantage.

This increase in the pulse rate is associated with a small rise in blood pressure; for the moderate smoker the rise does not usually exceed 20 mm. of Hg. systolic, and 8 mm. of Hg. diastolic, and is usually even less. The rise begins a few minutes after the smoking has commenced and is maintained throughout the smoking period.

These changes from the normal are, after all, usually small and give rise to no symptoms, but the evidence available suggests that they cannot be regarded with indifference. It is a maxim with those who are in training for athletic events that smoking must be entirely eschewed. This prohibition, no doubt adopted in the first place as the result of experience, has become a tradition.

Of the more definite effects which cause patients to seek advice some are palpitation and arrhythmia, which are relatively common in the young; they disappear if the smoking is stopped, though in pronounced cases, only after the abstinence has been continued for many months. The arrhythmia is functional and is usually due to extra-auricular systoles.

Arrhythmia may occur at any age but is more noticeable after 50; this may be due to a loss of tolerance which is known to occur in later life.

Another symptom which may arise from excessive smoking in later life is anginoid pain, which, according to Osler, rarely approximates to true angina. Turney says that it is associated with vasomotor disturbances and tends to occur after meals or in the night rather than after exertion.

Arterio-sclerosis is easily produced in animals, especially rabbits, by the injection of nicotine.

There is a consensus of clinical opinion that immoderate smoking favours arterio-sclerosis. Pawinski states that 42 per cent. of 1,000 cases of coronary sclerosis had histories of immoderate smoking.

Nicotine affects the brain and cord, it increases spinal reflexes and removes certain inhibitions.

A large experience of examination papers of medical students has enabled Dr. Dixon to pick out with certainty the heavy cigarette smokers, from the irregular character of their writing. If the habit is broken the writing at once improves and the vertigo disappears. These effects are exactly those of CO poisoning, and can be explained on this basis.

Habitual smokers are agreed that the weed acts as a mild sedative to the central nervous system; the type of action is of a somewhat remarkable character and may offer an explanation of the widespread use of tobacco.

Mental efficiency tests have not been very convincing. In Berry's experiments smoking enabled his subjects to do more rapid and correct arithmetical addition; but the nicotine here was not the determining factor, the aroma, and holding an unlighted cigar, or chewing substances like gum all had some effect.

The habitual smoker, when deprived of his smoke for some hours, showed diminished accuracy.

Many observations have been made by merely comparing the efficiency, mental or physical, of smokers and non-smokers. All these experiments are so difficult to interpret that their value is negligible. Generally they show some inferiority of the smokers. This is true of observations of scholarship, endurance of telegraph workers, scholarship and physical efficiency, and resistance to tuberculosis. The apparent inferiority may be the cause or the effect of the tobacco habit. Those who are handicapped by neurosis or other form of inferiority would succumb most easily to the euphoria of smoking.

It must be conceded that ordinary smoking in normal people does not lead to nervous disturbances. Excessive smoking is another matter, and may produce anxiousness and insomnia. Every smoker knows that a stronger cigar than usual may keep him awake, though usually the effects of smoking are soothing and favour sleep.

Tobacco amblyopia stands alone in mischiefs so grave. It was noticed by Mackenzie in 1835 and observed accurately by Hutchinson in 1864. The sight gradually becomes dim with central scotoma, some derangement of accommodation, and often dilatation of the pupil. This condition is associated with retrobulbar optic neuritis, and recovers if smoking is stopped; when degeneration has set in, however, abstaining from nicotine will only arrest further progress.

Androgé in a critical analysis of 48 cases of amblyopia from axial neuritis due to nicotine, says the quality of the tobacco is at fault; it was imperfectly dried, which means that the percentage of nicotine in the smoke is much greater than usual.

The rapidity with which people become accustomed to nicotine is remarkable. The degree of tolerance varies in different people, but it is never absolute. Wahl in 1920 found that non-smokers suffered from nausea and vomiting after taking by the mouth 1 to 2 mg. of nicotine. On the other hand, smokers required more than 8 mg. to produce the same effect.

Experiments of Dixon and Lee made on rabbits showed that repeated injections of nicotine into an

animal give to the tissues, and especially the liver, an increased power of destroying the toxicity of the nicotine. It is easy to conceive of several ways in which this might be brought about, but some of these possibilities may be eliminated by experiment.

Several clinicians have recorded cases showing a gradual drop in tolerance with advancing years. Finkelnburg says that patients, when once they have experienced symptoms of poisoning by nicotine, the particular form of which is immaterial, become more susceptible to the action, so that a smaller quantity of tobacco will reproduce the toxic symptoms.

The habit of smoking is sometimes referred to as an addiction. Rolleston discusses this question, and all it is necessary to say here is that addiction is a relative term; the most powerful drug of addiction is probably heroin, and then follow cocaine, morphine, Indian hemp, opium, alcohol, and last tobacco.

Reviews.

AN INTRODUCTION TO MEDICAL PROTOZOLOGY.—By Lieut.-Col. R. Knowles, I.M.S., Professor of Protozoology, Calcutta School of Tropical Medicine. 1928. Pp. 887, with 15 coloured plates and 174 text illustrations. Calcutta: Thacker, Spink and Co. Price, Rs. 25. London: W. Thacker and Co., 2, Creed Lane, London, E. C. 4. Price, £2-2-0.*

This manual is an ambitious extension of the small book *Lecture Notes on Medical Protozoology* published by the same author in 1923, which has now assumed the proportions of a textbook.

At first sight one was inclined to think that Col. Knowles' praiseworthy effort would be eclipsed by the splendid two-volume treatise recently published by Professor Wenyon, but on going through this book in detail one feels sure that it will serve a purpose which the more pretentious volume will not meet.

As befits a book written primarily for students and for a more limited audience, Col. Knowles' book is written in his well known facile (almost chatty) style which makes the book more readable than is the case with most books on protozoology.

He has freely acknowledged the abundant help he has received from such authors as Wenyon, Dobell, and Patton and Cragg, and such assistance (which the author calls "looting") is evident on almost every page. The reviewer has no hesitation in declaring on behalf of the Indian and tropical workers in general who will use this book, his admiration for the generous way in which these distinguished authorities have given their whole-hearted assistance to Col. Knowles in the compilation of this book and this is further evidence of the kindness which many workers in distant countries constantly receive from their more fortunately placed colleagues at home.

On proceeding to examine the book one finds a number of coloured plates, many full paged reproductions in monochrome, and a still larger number of illustrations in the text but there is no list of these given at the beginning of the book as is customary. We think that in future editions this should be rectified for the first two classes of illustrations at any rate. The coloured plates are for the most part good and bring out the finer points even if the colours are in some cases not quite true to life. The full page reproductions in monochrome (generally borrowed from other authors) are of very varying merit, many of them being weakly produced giving faint and indefinite outlines and a lack of contrast as if from over exposure of the negatives. This is distinctly a weak point in the

* It is perhaps unusual to publish two reviews of the same book; but, as we have received one from Lieut.-Col. F. P. Mackie, I.M.S., who is an experienced protozoologist, and one from Mr. R. Senior-White, F.E.S., who deals chiefly with the entomological aspect of the book, we publish both.—Editor, I. M. G.

production of the book and should be improved in subsequent editions.

The subject matter is arranged in the usual way and the *Rhizopoda*, *Mastigophora*, *Sporozoa*, and *Ciliata* successively dealt with. The intestinal amœbæ are clearly described and the author has wisely followed Dobell and his school closely, whilst not failing to castigate others (including himself) for the complexity which has shrouded this subject in the past. Even now despite the clearness of the text and of the illustration it is only the expert who will be able to differentiate the various intestinal amœbæ from one another. For the average worker all that is essential is that he be able to say with confidence "this is an *Entamoeba histolytica* or its cyst," the rest are of small importance and the writer has wisely stressed this point and following Wenyon, Dobell and others has laid down criteria which enable the distinction to be made with reasonable certainty. The reviewer agrees that amœbæ are too often diagnosed as pathogenic and that emetine is given far too frequently, and in his opinion (speaking for Bombay at any rate) amœbic dysentery is an uncommon disease.

The cytology of dysentery stools is clearly explained and it is shown that in most cases a confident diagnosis of acute bacillary dysentery can be given by the simple examination of a wet specimen so that serum treatment may be begun at once. This procedure has been followed in many laboratories for some years past. The appendix on the "Laboratory Examination of Dysentery stools" pages 101-111 is the most valuable part of this section.

To turn to the *Mastigophora* this section is of somewhat unequal merit. Looking to the complexity of the intestinal flagellates and their ill-defined position and relationship there has been an unnecessary amount of space devoted to them, with the result that the student will be confused with so much detail. Col. Knowles admits (and the reviewer agrees) that the pathogenicity of none of them has been proved and in a book which is of the nature of a practical guide, it would have sufficed to have given a much less exhaustive discussion of this class of commensals.

The chapters on human trypanosomiasis must be in the nature of things a frank compilation, but nevertheless a reasonably clear and accurate summary of the enormous volume of recent literature has been given.

We should expect on the contrary that the chapters on leishmaniasis would be in a different category and we are not disappointed. The fascinating history of this disease has been set out at great length and a fair picture has been presented of the labours of a succession of workers in this field.

Col. Knowles is rather hard on those who worked for years on the bed bug theory of transmission of kala-azar, forgetting that many of those who did so (including himself) approached the subject not as believers or disbelievers but as those attacking the prevailing hypothesis which had to be proved or disproved. More than a half of the scientific workers of to-day are engaged in proving or disproving the theories of others and it is one of the "last infirmities of noble minds" that induces distinguished people sitting in armchairs to let off a series of suggestions which it takes an army of workers to prove or more commonly to disprove. There should be a censorship of scientific theories before they are cast on to the world. The bed bug theory of kala-azar is a case in point.

Knowles prefers to retain the genus *Leishmania* in place of that of *Herpetomonas*, though the reasons for doing so are not entirely satisfactory, and certainly not the naive one that Leishman's name will otherwise cease to be associated with the parasite he discovered.

The reviewer is glad to see that the author adversely criticises the extraordinary findings of Laveran and Franchini and of Fantham and Porter on the relationship between the herpetomonads of insects and their transmissibility to vertebrate hosts. Such observations

should have provided work for our censor before being divulged to the scientific world.

The *Sporozoa* are fully dealt with, but the coccidia, especially the rare migrants of the human intestinal canal, receive an undue amount of attention.

The well worn subject of the plasmodia is well and clearly dealt with and in this section the coloured plates are good and the coloured scheme of transmission is excellent.

The chapter on the *Ciliata* is also good, but again unnecessarily prolix considering the unimportance of the subject to human protozoology.

The next lecture is devoted to the Spirochaetes and the author begins by stating his belief that these are not protozoa but probably bacteria and then, as it might appear illogically, proceeds to devote some sixty pages to their consideration in a book on protozoology. It is true that on the whole the evidence is more in favour of excluding the spirochaetes from the protozoa, but if they are to be described in a book like this it would have been better to have used the word (coined by Haeckel) Protistology, which includes the most primitive forms of both animal and vegetable life, that is to say both the Protozoa and the Protophyta. However, as Wenyon and most other protozoologists have adopted the same somewhat illogical course, criticism of this book is disarmed. The name *S. carteri* for the Indian spirochaete is attributed here and generally elsewhere to Manson, whereas it was first given by the reviewer early in 1907 before the appearance of Manson's edition wherein it also appeared. The granule phase of spirochaetes is referred to as doubtful and this represents the opinion of many experienced workers on the subject. There is a good description of the spirochaete of syphilis and some good practical hints as how best to reveal it.

There is a good summary on our knowledge of the *Chlamydozoa*, or rather of our lack of it and special reference is made to rabies under this head. Good as the appendix on antirabic treatment may be, it seems out of place in a book on protozoology and no one would look for it or expect to find it here.

The last 140 pages of the book are devoted to laboratory methods and we have no hesitation in saying that this is the best part of the book. The chapter dealing with sources of material is especially useful to those who have to provide students with preparations. Space does not permit the reviewer to refer in more detail to the excellent chapters on insect dissection, cultural methods, and all the practical technique of everyday laboratory work. Experience and practice is evident on every page and this information will be of much use to all laboratory workers whether protozoologists or otherwise.

The book ends with a copious bibliography which does ample justice to workers in India, some of whose writings have often escaped the notice of European and American writers, and the index is full and well arranged, whilst important subjects are indicated in heavy type.

On the whole we may congratulate Colonel Knowles on having produced a book adequately reviewing existing knowledge, whilst adding not a little from his large personal experience. It is written in a pleasant and easy style and the book is one which should take a high place in the routine work of the practical protistologist.

We take it that the book is designed not so much for the bookshelf as for the laboratory bench of the microscopist in the tropics and for this reason it is questionable whether in future editions the book should not be issued in two smaller and more handy volumes. One of these would contain the text in the form of a handbook and the second volume the valuable information on laboratory methods. In any case the text might profitably be cut down to eliminate much of a controversial and historical nature, leaving the discussion of such aspects of the question to the more formal and more critical textbooks.

Col. Knowles has produced an eminently useful and readable book and one which will find favour not

only with the students of the Calcutta Tropical School but also with the wider circle of laboratory workers in the tropics.

F. P. MACKIE.

The first impression left on one's mind by a study of this work is the amazing erudition of its author,—the second that were one a student, it would be impossible to assimilate sufficient of its contents to pass the final examination. Almost one sighs for a re-issue of the book's predecessor, *Lecture Notes on Medical Protozoology* as being more suited to the needs of the student who has a dozen other subjects to study simultaneously.

Be this as it may, the book will be a precious possession to the worker who wishes to continue the study of the subject further than the extent necessary merely for examination purposes, and one cannot help thinking that it was the fostering of this class of worker, now all too rare in India, the general professional man who makes a life study of one special subject of his profession, that was the primary object in the author's mind. The few such who exist in India will be for ever grateful to him. The mere diploma-hunting student gets what he wants of laboratory technique spoon-fed to him, the professional laboratory worker has at his disposal the resources of his Institute's library, but the lone man in the jungle, who most of all has at his door the protozoological rarities, has hitherto lacked a concise set of laboratory "tips," such as part II of the book is replete with, as much as he almost invariably lacks the resources of an adequate library.

The writer cannot attempt to criticize the book as a protozoologist of equal standing with the author; he can only do so from the viewpoint of the past student now engaged in one small special domain of applied biology. From this standpoint he would venture to remark as follows:—

Out of the plates of the amœbæ and their cysts, he would have liked to have had a composite one of all stages of *E. histolytica* and *E. coli* apposed, as these two species alone affect the average clinician and general pathologist in a small station. The discussion on pp. 96–100 of the possibility of other entamœbæ is likely to confuse the student, and seems in any case more suited to a separate paper than for inclusion in a textbook of this nature. The appendix on page 101 on the examination of the dysenteric stool will be invaluable to just the types mentioned above. On page 150 a key on entomological lines to the various intestinal flagellates is a desideratum. It has always surprised the reviewer that medicine makes so little use of this universal zoological and botanical aid. By such means, for instance, "differential diagnosis" would be enormously simplified.

In figure 37 on page 160 *Leptomonas* has been used instead of *Herpetomonas*, whereas the fact that the two are treated as if synonymous is not stated until seven pages further on. In spite of the author's preference for accepted names, according with diagnostic terms, there can be no doubt on the evidence he himself quotes that *furunculosa* is the correct name for the parasite of oriental sore.

The true history, from one engaged in it, of the work on the transmission of kala-azar will make the book for ever of value as a historical document. To one who had the privilege of working in Patton's laboratory during the later years of his bed bug work, however, the effort wasted on the bed bug merits neither the epithets "amusing" or "sorry," but rather sympathy with one of the ablest and keenest of living protozoologists who followed a wrong side-path and thus left to others more fortunate than himself the results of eighteen years of the hardest labour.

A point not touched on is why kala-azar in Europe is purely an infantile disease.

On page 281 an extremely lucid summary of the pathogenic trypanosomes is given. Passing to the development in *Glossina*, the writer, as primarily an

entomologist, most strongly shares the author's doubts as to the existence of a slit in the hypopharyngeal wall through which trypanosomes passing forward from the gut enter via the labial cavity. As he remarks, one would not expect such an aperture in an ectodermic structure, which would have to be sphincter muscled unless salivary fluid were to be allowed to enter the labial cavity at this point, instead of near the tip of the proboscis, in which case the forward extension of the hypopharynx would be useless. The slit, moreover, would be valueless to the fly, and only play a part in the life-history of the trypanosome, which, presumably developed from a herpetomonad, must have originally found exit by the posterior route. The writer prefers the theory of Robertson that the salivary glands are invaded via the tip of the proboscis, improbable as this seems from the protozoological standpoint. As the author points out, Lloyd and Johnson had no opportunity of cutting sections to confirm their hypothesis. It might be added that figs. 59 and 60 are not from the 1925 paper of those authors, as quoted in the bibliography, but from their paper in *Proceedings of the Royal Society of Tropical Medicine and Hygiene*, xviii, 243, December 1924.

In connection with trypanosomes the final paragraph on page 310 should be pondered by all who doubt the advisability of including mention of the related parasites of animals in works dealing with human diseases.

On page 320 it is stated that fish trypanosomes are conveyed by leeches. Are there not also Copepods so engaged?

The reviewer is glad of the pronouncement on page 369 of the original Arthropod origin of the malaria parasites. This view, which is his own, is directly contrary to that of a well-known Indian malaria worker whose answer to this will be eagerly awaited.

The book is marred by few errors. Fig. 9 on plate 80 is not to be found. *Cardium edule* is hardly a snail in the ordinary sense. *Spirulina* is usually accepted, on account of its colour, as a Cyanophyceous alga. As seems inevitable in Indian publishing, however, the illustrations, magnificent in the original, have been but poorly reproduced, and whilst this can cause nothing but sympathy for the author, it casts a slur on the imprimatur of the well-known firm on the title page.

The book may be confidently recommended to all workers in the field of protozoology, medical and veterinary, and most especially, as stated before, to the lone worker everywhere.

R. S.-W.

PRACTICAL BACTERIOLOGY, BLOOD WORK AND ANIMAL PARASITOLOGY.—By E. R. STITT, A.B., Ph.D., Sc.D., LL.D. Eighth Edition. London: Messrs. H. K. Lewis and Co., Ltd., 1927. Pp. xv. plus 837, with 1 plate and 211 other illustrations containing 683 figures. Price, 24s. net.

SURGEON-GENERAL STITT has a genius for writing students' textbooks; this one is now in its eighth edition and like its smaller predecessors it is crammed with well selected and clearly expressed information. The earlier editions achieved remarkable popularity all over the world, although they were far from being so complete or perfect as their latest successor. Stitt knows exactly what the student needs, a clear dogmatic account of the most important facts and methods: it is for this reason that the student and elementary worker finds his books so satisfying. Bacteriology, serology, blood examination, animal parasitology, protozoology, medical entomology, medical zoology, laboratory methods of examination are succinctly dealt with in a handy volume of 850 pages. An astonishing amount of useful instruction has been presented: those who know the book already will hasten to obtain this edition which has been greatly improved by the collaboration of many experts: those who do not know it will be well advised to buy a copy at the earliest possible moment. It is not an advanced worker's book but there are few who will not obtain many valuable hints from it; junior laboratory workers and medical

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men in general will find it a "ready help in time of trouble."

J. W. D. M.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY.—By W. A. Newman Dorland, A.M., M.D., F.A.C.S. Fourteenth Edition. London and Philadelphia: W. B. Saunders Co., 1927. Pp. 1338. Price, 35s. net.

THERE is a remarkable thirst for medical dictionaries; Dorland's has gone through fourteen editions since 1900; although only two years have elapsed since the thirteenth edition was issued there are no fewer than two thousand new words in this new issue. The completeness and accuracy of Dorland's dictionary are universally admitted, its attractive get up and handiness have probably played important parts in ensuring its popularity. It is appalling to think that something like 70,000 technical words are employed in medicine and that new terms are being added with ever-increasing frequency. The proper place for most of these is in a dictionary which can contain them without damage to its structure, whereas the human brain which might attempt to encompass them would have room for nothing else. Presumably such words as "laparohysterosalpingo-oöphorectomy" have their uses, but they are certainly terrifying. About five hundred persons have their names associated with a special type of operation and it is likely that the list is far from complete. It is not to be expected that all the information contained in such a book is accurate, for example, kala-azar is said to be "transmitted by the bite of the sand-fly, *Phlebotomus argentipes*, perhaps by the Indian bed-bug and by a mosquito, *Anopheles punctipennis*." We are glad to notice that no countenance is given to the very prevalent error of pronouncing chenopodium, chinolol, plasmochin, etc., as if the ch were soft as in choice; the correct method is with a hard ch as in the word chemist. The book is well worth buying not merely as a book of reference but also as a source of useful and interesting information.

J. W. D. M.

PHYSICAL DIAGNOSIS.—By Richard C. Cabot, M.D. Ninth Edition. London: Baillière, Tindall and Cox, 1927. Pp. xxii plus 536, with 6 plates and 276 figures in text. Price, 25s. net.

THIS is the ninth edition of Cabot's well-known book on "physical diagnosis." It has been thoroughly modernized and includes reference numbers to a set of gramophone records which will soon be on the market and will illustrate the various abnormal sounds heard in the heart.

Only the methods with which Dr. Cabot is familiar have been dealt with, but the reader will agree that these include all that the general practitioner can be expected to know.

This is eminently a book for general use; it is not an encyclopædia of diagnosis, but its value to the student and practitioner is all the greater because it selects the procedures which are in general use. It is a book which can be heartily recommended.

Annual Reports.

ANNUAL REPORTS OF (1) THE NATIONAL ASSOCIATION FOR SUPPLYING MEDICAL AID BY WOMEN TO THE WOMEN OF INDIA. (2) THE VICTORIA MEMORIAL SCHOLARSHIPS FUND. (3) THE LADY CHELMSFORD ALL-INDIA LEAGUE FOR MATERNITY AND CHILD WELFARE. FOR 1926. CALCUTTA, GOVERNMENT OF INDIA CENTRAL PUBLICATION BRANCH. PRICE NOT STATED.

THE introduction of these three reports in one annual volume is welcome, for it enables the reader to obtain

a more or less bird's-eye view of the activities of medical women in India. The volume is admirably illustrated, a photogravure portrait of Lady Irwin forming the frontispiece, and illustrations of the Lady Reading Health School at Delhi and kindred institutions showing that Imperial Delhi maintains its style of beautiful buildings in medical matters as well as in others. A useful map of India at the beginning also shows how widespread are the activities of the organisations concerned, though Burma, we note, appears to be very blank.

The Countess of Dufferin's Fund was inaugurated in 1885 to attempt the colossal task of providing the women of India with medical attendance by women doctors. Since its inception, it is claimed that the Provincial administrations—though they have contributed to the Fund—have not done much to further this object. It may be claimed that such an object tends to keep alive the purdah system, but this is an obvious fallacy; the purdah system is there, and it will continue, despite the desire of all sanitarians to the contrary; hence, for perhaps the majority of the women of India, medical assistance must be provided by skilled women doctors and trained female assistants. There would be no Indian girls' schools in this country if there were no women teachers, and the analogy applies in medical matters.

The report shows that 256 lady students are studying in India for a medical degree, and that four teaching medical institutions are for women only; whilst there were 105 lady students out of this total of 256 in the Lady Hardinge Medical College, Delhi, during the year. This college is staffed by 8 officers of the Women's Medical Service, India, and these professors have 200 beds under their control in the attached hospital. The Fund had 21 scholarship students during the year, whilst in the United Provinces there is a Lady Assistant to the Inspector-General of Civil Hospitals (Dr. Shirin Commissariat). The Dufferin Fund in general adopts two main methods of providing medical assistance to the women of India; (a) by supplying officers of the Women's Medical Service, free of charge, to take medical charge; and (b) by grants in aid; and in the report under review Miss A. C. Scott, M.B., Chief Medical Officer, W. M. S., gives an encouraging report as the result of her visits of inspection to the main centres concerned, from which we take the following abstract.

Miss Scott reports that, with one or two exceptions, there is a decided improvement in the equipment of these hospitals, many have added to the accommodation for patients, chiefly in the provision of maternity beds, for it has been the experience lately that women are more ready to come into hospital for confinements than they were 10 or even 5 years ago. This steady increase of maternity cases as in-patients is of immense benefit, not only to the mothers and infants concerned but in providing practice for students, nurses and midwives in the training institutions which are invariably attached to Dufferin Hospitals. The reason for this increase is not far to seek; it is due partly to the breaking down of superstitions and ignorance about hospitals and partly to the spread of education in maternity and child-welfare work, by means of Baby Weeks, trained Health workers and other propaganda. There is also no doubt that the better nursing obtainable nowadays in our women's hospitals is appreciated by the mothers, many of whom return again and again for subsequent confinements.

Hospitals in the Provinces are still very poorly supported by both the local Governments and the public, though the hospitals are used freely by both officials and non-officials. In one case the hospital, to which a doctor of the Women's Medical Service is supplied, receives from the public only one-third of the amount which is monthly subscribed to the local infirmary for diseased and decrepit cows. In more than one city the Municipal body has reduced its grant to the women's hospital and in one case the local Government's grant has also been reduced.

There is a certain unfairness in the treatment of women's hospitals. Local bodies exact heavy rates, taxes for water, etc. These hospitals have to pay equally high customs and octroi duty as private individuals for drug and hospital necessities obtained from England, unprocureable in India, whereas the main Civil Hospital in the same town, being a Government institution, is exempt from these heavy items of expenditure. It will be a happy day for women's hospitals when legislators will vote money amounting to even half the annual expenditure of each.

An interesting resumé of the activities of the National Association (Countess of Dufferin's Fund) was given by Her Excellency Lady Irwin in presiding for the first time at a Council meeting in September, and this summarises the present position so admirably that we quote from it *in extenso*.

The National Association for supplying medical aid by women to the women of India is of long standing. It is now in its 41st year, and as you know, devotes its funds chiefly to the training of Indian women as doctors, but also gives grants to hospitals for women in different parts of India.

The Women's Medical Service is in its 12th year; it is paid for entirely from the Government of India subsidy, granted for this purpose to the Countess of Dufferin's Fund. This Service, from having a cadre of 25 officers has now one of 44, also a Training Reserve of 8 women graduates of Indian Universities; these graduates after 3 years' service in Women's Hospitals are granted United Kingdom scholarships with travelling expenses to England and back for the purpose of post-graduate study fitting them for full membership of the Women's Medical Service. I am much interested to hear that during this year for the first time one of the graduates from the Lady Hardinge Medical College, Delhi, has been appointed to the Women's Medical Service, and will be joining the College as Professor of Anatomy for the coming season.

The provision of a service of fully qualified medical women is the foundation and pivot of all work of the other funds.

In the first place, these highly qualified women are essential for the training of the students at the Lady Hardinge Medical College, Delhi, which students in their turn will take the place of their teachers in the Women's Medical Service, and continue to carry on the provision of medical aid by women to the women of India.

Secondly, they are essential to train the students in the Health Schools, to be Health Visitors and Maternity Supervisors, without whom the Maternity and Child Welfare work under the Lady Chelmsford All-India League could not be carried on.

And lastly, they are essential for the training of *dhais* and midwives so urgently needed for the rendering of adequate and skilled assistance to Indian women in child birth.

While speaking of the Chelmsford League, whose activities are mainly directed to the training of Health Visitors and propaganda, I should like to mention Lady Reading's last splendid gift to this work, which was to provide funds to build a new Health School in Delhi.

Hitherto students have had to reside in hired quarters and their instruction has been given in the various Municipal Welfare Centres in Delhi. The new School which bears Lady Reading's name, and to which is attached the model Rai Sahib Nanak Chand Infant Welfare Centre, will be ready for occupation by 12 selected students in October this year (1926).

On the propaganda side, "Baby Week," inaugurated by Lady Reading, is now a successful yearly event all over India, and a proposal is before you to-day to bring the management of this activity under the Executive Body of the Lady Chelmsford League, and therefore under this Council.

I have been asked to tell you that it is proposed to hold a Conference of Maternity and Child Welfare Workers and those interested in the movement in Delhi

early in February. It is felt that the time has come to report progress on this work which has now secured a firm footing in India. Six years have elapsed since those interested in this increasingly important subject had the opportunity to meet together to discuss the various methods employed and the difficulties encountered. An All-India meeting of the kind suggested will certainly be helpful to all concerned, and will enable us to lay our plans for further progress with more efficiency.

Much has been done but much remains to be done especially on the preventive side.

First and foremost there is the terrible scourge of tuberculosis, so especially active among the women and children in our large cities. Maternal and infant mortality are still very high as compared with other civilized countries. Women in villages and even in small towns are in the large majority of cases still unable to obtain any medical aid from women, even in the shape of a trained nurse or midwife. Separate and specialised relief for women provided by Municipal Bodies and District Committees is so far practically nil, and it is a fact that, though the purdah system is less strict than it used to be, there are few Indian women even to-day who will allow themselves to be treated by men doctors for any but trivial ailments.

I have only briefly referred to a few of the major evils that are still practically untouched, but I think even these show how vast is the field of work which lies before us, and how necessary it is for us all to continue our efforts and to combine in devising the best and most efficacious means to overcome these difficulties and varied problems.

The first report, that of the National Association, incorporates several subordinate reports of the chief institutions maintained by the Fund. The Lady Hardinge Medical College at Delhi is clearly faced with the universal hospital problem of India—how to keep down the number of patients to reasonable limits; the admissions to the obstetric and gynecological unit for example were 1,709 in 1926 as against 1,355 in the previous year. Miss G. P. Patel's work in the Medical and Pathology Departments of the College is singled out for appreciative notice. Dr. Keane of the Victoria Zenana Hospital, Delhi, reports difficulties in filling vacant posts on her staff owing to the low rates of pay sanctioned; also shortage of water supply during the hot weather. Dr. Houlton of the Lady Reading Hospital, Simla, reports a year of very strenuous work, with an ever increasing flow of out-patients and in-patients, but without any increase of staff; and similar reports of the great increase of work come from Dr. Bolton at Dera Ismail Khan, Dr. O'Brien Beadon at Madras, Dr. Kamalakar in Bombay, and from almost every centre concerned. "Good work under trying conditions"—an extract from the report by Dr. Murphy, of the Dufferin Hospital, Shikarpur—might well be taken to summarise these reports from different centres. Dr. Dodhi, from Hyderabad, Sind, reports that "the in-door maternity cases have trebled this year." It is abundantly clear that the policy of the Association is admirably suited to the needs of India. Further,—and this is a point of special importance—several Superintendents of Lady Dufferin Hospitals emphasise the special popularity of paying cabins for maternity patients from better class Indian families. Dr. Stapleton of Calcutta writes that extra beds have had to be put on the verandahs, and that an additional new ward is necessary. Also, throughout the report we are glad to see that special attention is being paid to the provision of suitable nurses' quarters, a matter which is all-important in this country. On the other hand there is general comment on the cutting down of local grants; on the parsimonious support given by the Indian community—who are very ready, however, to take advantage of the hospitals; on the need for better buildings and increased staff. A statement of the financial position of the Association shows investments of the total market value of Rs. 6,54,366 and trust funds to the value of Rs. 37,412; the total assets during the year—including income—were Rs. 8,47,802, and the

expenditure Rs. 1,26,182, with a closing balance of assets of Rs. 8,47,803 showing that the Fund, although not as well supported as it should be, is carefully administered. During the year a separate account was commenced for the Provident Fund for the W. M. S., India. Among the annexures to the report is a Seniority List of the Women's Medical Service which shows that there are 42 officers on the permanent cadre, with 2 temporary members, and 5 in the training reserve.

The second section of the report deals with the Victoria Memorial Scholarships' Fund. Here the general trend of the report is that progress is slow. "Miss Piggott in Sindh reports that only 200 women out of a possible 5,000 have been trained as *dhais*. This is disquieting, and the feeling of anxiety is not lessened by the realisation that the training of the remainder of the *dhais* is still a matter of great difficulty"—is a typical sentence from the report. Untrained *dhais* are trained chiefly in one of three ways: (a) by medical men and women; (b) by health visitors; and (c) by hospitals. The last is the most ideal method, whilst the first leaves something to be desired. A scheme has been started in Bengal for the training of *dhais* by private practitioners in the mofussil and the results of this experiment will be watched with interest. Training by health visitors is reported to be very satisfactory.

The difficulty about training in hospitals is the unwillingness of the pupils to leave their village homes for residence in hospitals in large centres of population. In the Punjab, as one would expect, ante-natal work has to be carried out chiefly in the homes of the people; "domiciliary midwifery, in view of the social customs and usages in force, must continue to be the main channel for conveying relief to the large majority of needy cases for some time to come." It is to be regretted that the expenditure from this Fund exceeded the income by Rs. 6,000, the total expenditure being Rs. 46,814 for the year. The Fund stands in need of philanthropic assistance if its admirable work is to continue.

The third section of the report deals with the Lady Chelmsford League for Maternity and Child Welfare. During the year the League supported or assisted four Health Schools, at Delhi, Lahore, Madras and Calcutta; the first named being the Lady Reading Health School. During the year the School moved into new and commodious quarters and is now a model of what it ought to be. The attendance at the School averages 35 to 40 expectant mothers daily, and the course offered to students is a very complete one, even vaccination and a study of child psychology being subjects in the curriculum. A special difficulty which appears to be encountered in North India is the lack of knowledge of English among the applicants for training at such a school, and classes have had to be held in the vernacular. On the other hand there are no textbooks in the vernacular, and lack of knowledge of English by the would-be students is generally an indication of an unsuitably low general level of knowledge. Well educated Indian girls appear to be backward in coming forward for training in midwifery. On the other hand it is reported from the Punjab that the education of girls is proceeding at a rapid pace, also that the school there has had ample financial help from the local Government. The Bengal centre is a very small one, with only three pupils, but Simla, Madras, and Bangalore report an influx of students. In connection with propaganda work the demand for publications, pamphlets, and posters is a steady one, though not vast in amount. The introduction of uniform record forms for maternity cases will help materially in connection with the collection of statistics, whilst the cinema is constantly in demand, and the exhibition of films illustrating maternity and child welfare work appears to be one of the best methods of instructing a rural population.

We have attempted to review this admirable report briefly, but in due measure; and we much regret that

the extreme pressure on our available space has previously held it up. The entire report is a record of steady and sustained progress. The report itself is also a great improvement on the reports for previous years: unlike them it gives the reader a real account of the work which is going on—work of tremendous importance for the future of India—instead of being a dry compilation of figures.

Correspondence.

TETANUS AND THE BONE-SETTER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case appears to be worthy of record in your columns.

A boy, A.B., aged 12 years, was brought to this dispensary on the evening of the 25th July, 1927, with a fracture of the internal condyle of the humerus, due to a fall from the parallel bars of a gymnastic apparatus whilst practising in a local school. The fracture was set and splinted, and all splints were discarded on the 14th August. On this date he could extend the arm completely, but could not completely flex the elbow. He was now put on to liniments and massage, and his relatives took him away. They were advised to consult a local practitioner in their neighbourhood, but did not do so. Instead, they took the boy to a local quack bone-setter.

The bone-setter claimed that the fracture had not been properly set, and advised that it be "re-set" and properly bandaged. With the permission of the relatives, he accordingly broke down the fracture, re-set the limb, and applied a bandage of date palm leaves and *Khol*—(a preparation of sesamum seeds, which is used in the form of cakes, and forms part of the diet of cows and buffaloes). On the third day the bone-setter applied a second dressing. Three days later, he advised the application of a hot tile, bandaged the limb tightly and applied a red hot tile to the elbow. The boy complained of intense pain, but was persuaded to undergo the treatment. He was sleepless for the whole night, and next morning cedema and blisters appeared on the hand and shoulder of the affected limb; these, he was told, were due to an insect bite.

That afternoon the patient removed the bandage for himself and was horrified to find the elbow very badly burnt. The bone-setter now advised the application of an infusion of certain leaves and prescribed an ointment; he then left the village, as he stated that he had urgent appointments elsewhere.

I saw the patient again first on the 28th September, 1927. By this time he had an ulcer 5 inches in length and 1½ inches in depth in its centre over the elbow. I dressed this and advised that he should be brought into my dispensary at Una. He was accordingly brought to hospital four days later.

On the 2nd October, 1927, typical tetanus developed, which set in gradually and by degrees. I wired for antitetanic serum from Bombay, applied hydrogen peroxide locally, and gave bromides and opium. Amputation was advised as the boy was in a critical condition, but this was refused by the relatives. Finally the serum arrived from Bombay and the patient was at once given 40 c.c. intramuscularly into the gluteal region, followed by a further similar dose the next day. Within fifteen days all symptoms of tetanus cleared up, and within a month the wound had healed. In his present condition the elbow is still flexed by scar tissue, (2nd November, 1927), and the hand in a condition of pronation. A plastic operation has been advised, but it is doubtful whether the relatives will consent.

The relatives were advised to lodge criminal proceedings against the bone-setter, but were unwilling to do so, as they put the blame on "destiny."

To what extent do Medical Councils and Registers help the qualified medical man in this country in connection with such cases?—Yours etc.,

G. M. MAHADEVIA, M.B., B.S.

UNA, KATHIAWAR.

24th December, 1927.

THE LABORATORY CONSULTANT.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I beg to seek the support of your journal in giving my opinion in connection with laboratory diagnosis as carried out in Calcutta, and in certain *mofussil* towns in which I have practised. There is no question of the importance nowadays of laboratory aid in matters of diagnosis and prognosis, but in my opinion, in Calcutta at least—a city with regard to which I can now speak from some years' experience—the enthusiasm for laboratory diagnosis has attained a degree of perverted prominence which I have never observed in England, Scotland, or Ireland. The vast majority of general practitioners in Great Britain carry out the commoner laboratory tests for their patients themselves, and for doing so very few of them charge anything extra at all. Also in the big British hospitals either the physicians in charge—or more usually the clinical clerks or house physicians—carry out the simpler necessary tests, such as urine and stool examination, the differential leucocyte count, etc., and examinations of the sputum are carried out in less time than it would take to examine the larynx.

In Calcutta matters are apparently different, for there are a whole host of 'heart and lung specialists,' of biochemists and bacteriologists. The general practitioners in this city appear to have surrendered to the claims of the laboratory consultant. Surely it should not be beyond the powers and intelligence of the ordinary general practitioner to carry out the simple examinations required to find out whether his patient is suffering from malaria or kala-azar, from amoebic or bacillary dysentery; but apparently it is. He prefers to pin his faith to "therapeutic diagnosis," by which is meant that a given drug may or may not cure the patient, either by accident or because it is efficacious. Of course if the injection of drugs is the easiest road to money making, then, from a commercial point of view he is right. But it is not difficult to examine a specimen of urine for albumin and sugar, a specimen of sputum for the bacillus of tuberculosis, or a blood film for malaria parasites. Yet a general practitioner who will not hesitate to carry out a relatively difficult ophthalmoscopic examination will refer his patient for such laboratory methods of diagnosis to a "laboratory consultant." Again and again I have met with patients who had been referred to "research companies," when the necessary simple examinations could just as well have been carried out by the general practitioners concerned. Some of such reports have cost as much as Rs. 20 each—a sum which even well-to-do European patients might find it difficult to afford.

General practitioner as I am, I find myself constrained to protest against such a state of affairs. Where Dr. Napier and Major Chopra, I.M.S., have been striving to introduce simple and reliable tests suitable for the diagnosis of kala-azar by the general practitioner, there are laboratory specialists who will charge Rs. 10—or more for all that I know—to carry out the same tests. Why this cruelty to a community that is neither protected by a Health Insurance Act, nor by the provision of many charitable institutions?

The general practitioner in India should realise what it is that drives the ordinary Indian patient to the 'homoeopathic,' the Ayurvedic and the Unani "systems" of treatment; it is their cheapness. But, with the assistance of the "laboratory consultant" we are making modern and scientific medicine too expensive for the ordinary Indian patient.

On the other hand, where there is real necessity for expert laboratory opinion, too often this is neglected

or overruled. To give an example I could quote two cases where lumbar puncture in the presence of almost certain meningitis was called for; the general practitioner in charge refused to have the operation carried out, because "it had never been done on any of his patients before." On another occasion analysis of the gastric contents was clearly called for, but this was refused, as it was a "messy affair." I have seen numerous cases of syphilis treated on clinical lines, without the Wassermann reaction being tested, and with no serological control as to the results of treatment or the indications for its discontinuance or otherwise. Recently a general practitioner who is familiar with Gram's stain, however, asked me if I could give him instructions as to how to prepare an autogenous vaccine—a line of work which would clearly increase his emoluments.

These matters need serious consideration by both the hospital authorities and private practitioners in Calcutta and in the big cities of India. Above all, and first and foremost, it appears to be necessary to drive home into the minds of medical students at college that the practice of medicine is in itself an art and science, and neither a money-making business, nor a house of charlatans and mystics.—Yours, etc.,

'G. P.'

CALCUTTA.

11th December, 1927.

(Note.—We do not publish anonymous contributions, except under exceptional circumstances, but 'G. P.'s' letter seems to warrant a breach of this rule, for he clearly speaks from personal experience, and has Indian, Edinburgh, and Dublin qualifications. Our sympathies lie entirely with him. If the general medical practitioner in India is not competent to diagnose a case of malaria by examination of blood films, a case of amoebic or bacillary dysentery by microscopical examination of the stools, a case of kala-azar by the simple serological tests, a case of plague, leprosy, or pulmonary tuberculosis by simple microscopical tests, then something is radically wrong. And that "something," if this be the case, is his medical education. To teach the practice of medicine to medical students in India it is necessary to recognise that tropical diseases are those which are most important in India, and not to model curricula for qualifying examinations upon British university syllabuses of twenty years ago. Finally, one would add that the laboratory worker himself, if he be worthy of his salt, will desire to be freed from such routine examinations and to have his time liberated for real research work.—EDITOR, I. M. G.)

INTRAVENOUS INJECTIONS OF SODIUM SALICYLATE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—For the past two years I have been using the intravenous route for the administration of sodium salicylate in cases of rheumatic and myalgic affections with very good results. The relief of pain is rapid, the stiffness disappears much more quickly than by the oral route of administration; and the period spent in hospital is also cut short.

The strength which I use is 10 grains in 10 c.c. of water. Ten grains of sodium salicylate are dissolved in 10 c.c. of sterile water. This is then filtered into a test tube and boiled. The next step is to fill a 10 c.c. syringe, sterilise the skin over the median basilic vein, and to give the injection. I have never had any bad effects follow this line of treatment; also it has a certain diuretic action which helps to eliminate toxins.

I give two injections a week, and during the intervals the patient is on an alkaline mixture. During the acute period the diet is regulated to milk, rice *conji*, barley water, soda water, and so on; but once this period is over the patient is promptly put on to a very liberal and nourishing diet. Should the

patient be a "bed" case, a weekly purge is also administered.—Yours, etc.,

A. BAYLEY DE CASTRO,
Junior Medical Officer.

PORT BLAIR, ANDAMANS.
17th December, 1927.

RAILWAYS AND MALARIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Professor A. Castiglioni in his article on "Malaria Control in Italy" in the *British Medical Journal* for the 13th August, 1927, has emphasised, amongst other measures, the necessity for the draining of possible breeding grounds of *Anopheles* larvae.

Travellers by railway must have frequently noticed the collections of stagnant water on both sides of the East Indian Railway from Burdwan downwards; on the Eastern Bengal Railway from Howrah upwards; and on the Bengal-Nagpur Railway; and almost along the whole of Northern Bihar along the railway there.

Railways are a most prolific source of *Anopheles* breeding places and of malaria of virulent type, and this applies equally to old established lines with borrow pits, badly designed culverts, and collections of standing water along the line, and to newly opened up sections where the engineering operations involved may frequently make conditions favourable for malaria where previously they were unfavourable. It is a common saying in Bengal that malaria spreads with the railways; that there is some truth in it is evidenced by seeing places which were once regarded as sanatoria now considered to be hotbeds of malaria after the introduction of railways into the areas concerned. The usual cause perhaps is the damming of the natural channels of drainage by railway embankments, these rendering the soil water-logged and giving rise to numerous sites suitable for *Anopheles* breeding places.

In order to remedy such conditions it seems to be absolutely essential that all new railway systems introduced should be compelled to allow of adequate natural drainage across the embankments made; and the same rule should also be applied to those railways already in existence. In Bengal at least, we are now accustomed to the saying "More railways, more malaria."—Yours, etc.,

K. C. GHOSE,
Assistant Surgeon.

MONGHYR.
8th January, 1928.

(Note.—"Malaria and railways" is an old standing subject of controversy in Bengal, if not in other parts of India also. There can be no doubt as to the crimes committed by bad alignment of railway arches and bridges—and especially culverts—which often create suitable *Anopheles* breeding places. Yet borrow pits and collections of standing water by the side of railways are often a less dangerous source of malaria than is usually supposed. On the other hand, malaria on Indian railways is a problem of special interest, since so many of the running staff are exposed to infection at night on trains, etc., who would not be so exposed if their duties were confined to the day time. That the railways of India are tackling their malaria problems seriously is shown by the recent advertisement for whole time malariologists for the four leading railways of India.—EDITOR, I. M. G.)

THE PERNICIOUS ANÆMIA OF PREGNANCY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—On reading Dr. Margaret Balfour's very interesting article on this subject in your issue for September 1927, I am tempted to send you an account of

my own experience of this disease. I think that there is little doubt that the disease is becoming more prevalent; formerly cases of anæmia during pregnancy were rare, and were not accompanied by albuminuria and nephritis, but during the last year I have been called in to no less than four cases of profound anæmia in pregnancy, none of them associated with albuminuria or hepatic cirrhosis.

All four patients were young females of about the age of 20 years, belonging to fairly well-to-do and cultured Indian families, and not leading a strictly indoor or very sedentary life.

The first patient developed the symptoms in the 9th month, and had premature labour about 20 days before it was expected. She died on the 9th day after delivery. Various mixtures and injections of iron and arsenic were tried, without any success.

The second case showed marked symptoms of anæmia during the 7th month. Nothing could stem the progress of the disease, and she died undelivered about two months later.

The third case was noticed towards the end of the 9th month. A fortnight later she was delivered normally, and then steadily improved. Her health now, in the 3rd month after delivery, is very good. The child was none the worse for the maternal complaint.

The fourth case is a primipara, now 7 months pregnant. Her case is being anxiously watched. Everything possible has been done for her in the way of administration of drugs, but without benefit.

In all four cases, vomiting and a rapid pulse—about 120 per minute—were marked features. I have not seen diarrhoea associated with the condition; there is rather a tendency to marked constipation. The hæmoglobin index is about 20 per cent., whilst the blood picture is very atypical.

The incidence of this disease in India is so marked that one wonders why it has not attracted more attention.—Yours, etc.,

VENILAL N. MODI, M.B., B.S.

RAOPURA, LINDAPOLE, BARODA.

8th January, 1928.

MIGRAINE AND SUGGESTION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—There is no doubt that migraine, in its severest forms, is one of the most terrible ailments that afflict the human body, and much interest has been aroused throughout the medical profession in all countries by the discussion on migraine at the Annual Meeting of the British Medical Association in 1926.

The interest has been continued and sustained by correspondence in the medical press on the subject of migraine—its causation and treatment. I do not think that I have missed any important part of the symposium of learned and acknowledged expert opinion. I gather that the treatment of this terrible affliction—like all Gaul in the time of Julius Cæsar—is divided into three parts:—

(a) The anti-proteid, anti-acid-producing, anti-acid-containing dietetic therapy.

(b) The anti-carbohydrate dietetic therapy.

(c) The combined medicinal and dietetic therapy; this part being sub-divided into what I may term, for the sake of brevity, $\frac{c}{2} + a$, and $\frac{c}{2} + b$. The first

part of (c) may be again and again divided in accordance with the tastes and fancy of the particular practitioner concerned, and his predilection for the older or newer drugs, from the salicylates to the latest coal-tar derivatives from the ex-enemy countries.

The factor of heredity is cited, and reference is made to the pathognomonic, customary, and mathematical periodicity of the symptoms in this fell disease. Causation—immediate, predisposing, and remote—is discussed, and theories are elaborated in a wealth of detail, from

faulty metabolism, endocrine disturbances, and hepato-gastric deficiencies in general, to idiosyncrasies and specific food-toxæmia. We are advised that, as many factors play their part in the etiology of this disease, treatment can only be carried out by well-organised and co-ordinated team work by the "close association of the physician, the neurologist, the ophthalmologist, the rhinologist, the dental surgeon, the pathologist, the biochemist, the psychologist, and other specialists,"—(the italics are mine). It is pointed out that change of climate and environment, relief from domestic cares, the stimulation of new scenes, and fresh interests in particular cases have seemed to prevent attacks, and this gives *some support* (*sic.*) to the usual view that migraine is essentially a neurosis.

A similar line of argument would relegate to the same category many diseases which are admittedly *not* neuroses. In the discussions to which I refer, attention was drawn to the nomenclature of the disease, to its symptomatology, its incidence with regard to age, sex, and heredity; to certain obvious exciting causes with special reference to eye-strain, vascular disturbances, and endocrine deficiencies; with further etiological considerations from the ophthalmic and other standpoints, and reference to the cranial, extracranial, and intracranial causes of headache in general, and of hemicrania in particular.

I do not propose to follow the arguments and opinions which have been put forward in detail. One writer gave it as his considered opinion that migraine—like such other explosive diseases as asthma, gout, epilepsy—resisted treatment because it is not a *disease*, but a *dialthesis*, passed on from generation to generation. It is indeed extraordinary how many patients and how many doctors are reconciled to this policy of despair.

There is a patient living near me in Bombay, whose case I simply yearn to tackle. My reasons are not mercenary, as he is on my free list. He suffers from "paroxysmal hemicrania," and suffers often and terribly. He refuses treatment, because his mother suffered in exactly the same way, and he has obviously inherited his malady. Inherited liability in many cases is undoubtedly a powerful factor, but many cases originate in individuals *de novo*. Everything has a beginning somehow, somewhere, and somewhere. I am concerned at present, however, with the unsatisfactory state of the therapeutics of migraine and allied ailments.

We are overwhelmed with theories as to its causation, immediate and remote, from vaso-motor disturbances to pituitary enlargement, and from eye-strain to neurasthenic heredity. I need hardly say that I am in full agreement with many of the reasonable arguments advanced in the discussion, and with the view that the causation of migraine should be viewed from different standpoints, mental and psychical, whilst physical disturbances underlying the condition may also call for investigation and treatment. Whilst agreeing with all this, however, I am from time to time confronted with cases of migraine in which all such investigations have had no results, sometimes after a period of years and investigation by experts in many different countries. Am I to turn such patients down with the statement that I can do nothing for them? I can prescribe laxatives and purgatives, or salicylates and bromides: I can give antipyretic and analgesic drugs: I can confine them to strict dietaries—excluding every article of diet which, in their experience, may precipitate an attack: or I can order complete rest and a change of climate if their means will afford it; "but, as for cure, dear Sir, or Madam, the age of miracles is past. I do not know whether you have had endocrine or peptone therapy, and, though I am myself inclined to the vaso-motor as opposed to the gastro-hepatic theory, I do not propose to experiment with your organism by the exhibition of cerebral depressants or vaso-dilators with whose action and therapeutic activity I am not familiar. I must therefore advise you to proceed to Mentone, which has a relaxing climate and is nowadays comparatively free from Germans; or to Pontresina, which is exhilarating; anyhow you must depart

from this neighbourhood which you find unsuitable at the very onset of those premonitory symptoms with which your fourteen, eighteen, or twenty years of experience of the condition have doubtless made you familiar. If you cannot afford to take advantage of this advice, I can only recommend you to suffer as patiently as may be for a further period of years, until your time has come to depart for a better world. The approach of senility, or the menopause, may indeed relieve you in great measure; or, on the other hand, your symptoms may be aggravated by these conditions. I do not wish to be a Job's comforter, but your prospects are not bright. I regret that the present state of the law does not permit me to inaugurate a system of euthanasia on your particular behalf."

I have referred to inherited liability in these cases, but the factor of expectancy must not be ignored. I have at present a patient who has suffered for about twenty years from typical migraine, with but few remissions, the attacks occurring weekly or bi-weekly. One Monday morning I asked "How have you been during the week end?" The reply was "Quite all right, but then, you see, I am not due for an attack until Wednesday." Here we have a very powerful *malefic* auto-suggestion, which, being translated, means "I am due for an attack of migraine on Wednesday" and, sure enough, on Wednesday afternoon there arrives on time the aura characterised by visual or other customary phenomena, headache, alternately unilateral, nausea, vomiting, extreme depression, and exhaustion.

I have another patient who for five years suffered from daily paroxysmal unilateral headache. Under treatment by suggestion (in the waking state) he has been free from headache of any kind for the past eleven months, and is apparently cured, all other previous treatment having failed. As I write, there is seated in an armchair in my office a young educated Hindu, the son of a physician, who has consulted every possible medical opinion during the past fourteen years. A few months ago his father asked me if I could do anything for the son, who was in an alarming state of depression verging on melancholia. The attacks came on tri-weekly, lasted for some ten to twelve hours, were of the most severe type, with nausea and vomiting. When I first saw him he had just recovered from an attack which had left him with a condition of ptosis of the left eye, which rendered him more self-conscious than ever, and he was wearing dark coloured glasses to avoid observation. I have treated him entirely by suggestion, without any other line of treatment, for six months, and for two months he has been completely free of headache. The factor of fear, and of expectancy of an attack at a regularly recurring date is most important in many of such cases, and must be eliminated by suggestion.

It is difficult to dogmatise. Undoubtedly the causes of migraine are manifold; but experience and trial will teach one the best methods of therapy. A further example may suffice. Six months ago I was asked by a well-known Mahomedan lady to see a friend of hers, the wife of a *mullah*, who had been suffering continuously from headache and earache for six months—a condition which all lines of treatment tried had failed to cure. She was 55 years of age, and was ignorant of English, and I hesitated to undertake the case. On arrival at the house I found a piece of paper fastened to her hair above the left ear, which was the seat of the trouble, with a verse of the Koran inscribed upon it. I need hardly say that I made no attempt to interfere with this source of spiritual help; but proceeded to give suggestions of a curative nature in my halting Hindustani, having first satisfied myself by physical examination that there was no tumour, abscess, or other organic lesion to account for the trouble. A single sitting produced immediate relief from all symptoms of pain, and during the past six months there has been no recurrence.

One cannot account for the success of such suggestive therapy in any direct manner. In the above

case, however, it is clear that the earache was due to a chronic congestive state. The suggestions, which were accepted by the patient, gradually and teleologically relieved the excessive pressure of blood in the blood vessels of the ear, with immediate relief of the symptoms.

To those who disbelieve in the power of the mind, under mental suggestion, to influence the physical state of the body, I would recommend a study of the well-known works upon the emotions, which detail how fear causes blanching of the face, or anger a flushing of the facial and cervical capillaries. Apply this teaching to the cases of migraine—and they are many—which are amenable to suggestion therapy. "Suggestion is not a cure-all." But is that a logical reason for refusal to apply it in cases which appear to be suitable? Whatever the causation of migraine—whether due to vascular spasm, to endocrine disorder, or to local oedema—my experience is that the majority of such cases are readily amenable to suggestion therapy, when scientifically and methodically applied. Intelligent co-operation on the part of the patient, of course, is a *sine qua non*. Suggestion in such cases may be an empirical remedy, but it is an efficient one. Of course, it must be preceded by thorough physical examination, and mental and dietetic errors may require to be corrected. On the other hand, the psychical factor in such cases appears to be paramount. I know of one patient—a medical practitioner—who confesses to me that his attacks are often self-induced, and occur when he thinks over his liability to them; of another who suffered from migraine after apparently curing a patient suffering from the same complaint, apparently as the result of auto-suggestion.

Opinions with regard to mental therapy by suggestion are apt to proceed to one of two extremes; there is the type of medical man who shuts his eyes completely to its possibilities, and condemns the method without a trial; on the other hand, there is the type of practitioner who expects too much from it. *In medio tutissimus ibis.*—Yours, etc.,

W. NUNAN, M.D.,
Police Surgeon, Bombay.

BOMBAY.
10th November, 1927.

Service Notes.

APPOINTMENTS AND TRANSFERS.

The Viceroy and Governor-General has been pleased to make the following appointment on His Excellency's Personal Staff, with effect from the date specified:—

To be Honorary Surgeon.

Lt.-Col. F. P. Mackie, O.B.E., M.D., F.R.C.P., F.R.C.S., I.M.S., *vice* Lt.-Col. T. S. Novis, F.R.C.S., I.M.S., retired. Dated 21st November, 1927.

Lt.-Col. F. E. Wilson, I.M.S., an Agency Surgeon and Civil Surgeon, Quetta, is appointed to officiate as Residency Surgeon and Chief Medical Officer, Baluchistan, in addition to his own duties, with effect from the 1st January, 1928, and until further orders.

The services of Major M. G. Bhandari, I.M.S., are placed permanently at the disposal of the Government of Bombay, with effect from the 21st September, 1927, for employment in the Jail Department.

The services of Major K. B. Bharucha, I.M.S., are placed permanently at the disposal of the Government of Bihar and Orissa for employment in the Jail Department.

The services of Captain Som Dutt, M.C., I.M.S., are placed at the disposal of the Government of Bengal, temporarily, for employment in the Jail Department, with effect from the date on which he assumes charge of his duties in that Department.

Consequent on the appointment of Bt.-Col. S. R. Christophers, C.I.E., O.B.E., I.M.S., Director, Central Research Institute, Kasauli, as Member and Secretary of the Medical Research Institute Committee, Captain K. R. K. Iyenger, I.M.S., Assistant Director, Central Research Institute, is appointed to officiate as Director of the Institute with effect from the afternoon of the 3rd January, 1928.

To be Captains.

W. D. B. Read, 27th September, 1926, with seniority 16th May, 1926.

J. F. Hinksman, 27th September, 1926, with seniority 7th April, 1925.

J. L. Donnelly, 27th September, 1926, with seniority 21st March, 1925.

To be Lieutenants.

J. H. Clapp, 26th August, 1926, with seniority 15th June, 1924.

W. J. A. Coldstream, 27th September, 1926, with seniority 1st October, 1925.

T. A. Malone, 15th October, 1926, with seniority 2nd March, 1925.

(The notification in the *Gazette* of 11th March, 1927, in so far as it relates to these officers is cancelled.)

To be temporary Lieutenants with effect from the dates specified:—

Nauikram Chatsing Ramchandani. Dated 15th December, 1927.

Hasibul Hasan Khan. Dated 15th December, 1927.

Eruch Ardeshir Darukhanvala. Dated 16th December, 1927.

Michael Rodrigues. Dated 20th December, 1927.

LEAVE.

Major H. E. Shortt, M.B., I.M.S., an officer of the Medical Research Department on foreign service under the Indian Research Fund Association, is granted leave on average pay for 8 months with effect from the 1st April, 1928, or subsequent date on which he avails himself of it. His services are placed at the disposal of the Director-General, Indian Medical Service, with effect from the date on which he proceeds on leave.

PROMOTIONS.

Lieut.-Colonel to be Colonel.

Brevet-Colonel A. Spitteler, O.B.E., M.D., I.M.S., *vice* Colonel George Browne, D.S.O., M.B., I.M.S., retired. Dated 27th December, 1927.

Captains to be Majors.

P. Verdon. Dated 1st December, 1927.

J. M. Shah, M.B.E. Dated 17th December, 1927.

S. A. Phatak. Dated 23rd December, 1927.

Shridhar Atinaram Phatak. Dated 23rd December, 1927.

Reginald Arthur Waters. Dated 12th January, 1928.

RETIREMENTS.

Colonel A. Fenton, M.B., I.M.S., retires 25th November, 1927.

Colonel Robert Welland Knox, D.S.O., M.B., F.R.C.S. Dated 1st January, 1928.

Lt.-Col. L. T. R. Hutchinson, M.D., I.M.S., retires 19th November, 1927.

RESIGNATION.

Captain E. Kean, M.B., resigns his commission, 19th December, 1927.

NOTES.

THE THIRTY-THIRD CHEMISTS' EXHIBITION, LONDON.

The 33rd Chemists' Exhibition will take place, May 7th–11th, 1928, at the Holland Park Hall, London, W. The Exhibition was established in 1896, and has filled a very important need to the practising pharmacist in enabling him to see all the goods he sells and the

apparatus; etc., he uses in his profession, under one roof. The management is always delighted to welcome visitors from the Dominions and Colonies, and such gentlemen will be admitted on presentation of business card. The Exhibition is organised by the *British and Colonial Pharmacist* and is strictly confined to the Trade. The 1927 Exhibition was much the largest and most important yet held and the attendance exceeded all previous records, and the prospects for the coming events promise an even greater success.

RADIO-MALT.

THE necessity of vitamins in the diet was first clearly shown by Professor Gowland Hopkins of Cambridge in 1906—1912; and of the five vitamins at present known those most needed to be super-added to the normal dietary are vitamins A, B, and D, since natural food-stuffs are frequently lacking in them. Vitamine A in reality consists of two elements, vitamine A proper—which is a growth-promoting principle, and vitamine D, which is the anti-rachitic vitamine. The former also appears to help to maintain the bodily resistance against infections.

As the outcome of several years to experiment, the British Drug Houses, Ltd., London, have produced "Radio-Malt," a food accessory particularly rich in vitamins A and D. According to the claims of the manufacturers, the vitamine A in this is contained in a tasteless oil, now utilised for the first time as an accessory food. The vitamine D is derived by ultraviolet irradiation of its provitamine, i.e., ergosterol. These elements are combined in "Radio-Malt" with malt extract; the combination being free from cod-liver oil. This accessory food is especially indicated for administration to growing children, to weakly and tubercular children, and to invalids and convalescents. It is also of special value to the nursing mother, since both vitamins A and D are excreted in the maternal milk.

Radio-Malt is available from most chemists and druggists, and is put up in 1 lb. and 2 lb. jars. The Calcutta Agents are Henry S. Clark, 8/10, Waterloo Street, Calcutta.

A NEW VITAMIN PREPARATION.

THE problems of avitaminosis in India are very great. In the first instance religious customs debar certain castes from a dietary which contains a full vitamine content. In the second place climatic factors may affect the vitamine-content of what would otherwise be a satisfactory diet. The labouring and coolie class in India particularly, perhaps, suffer from vitamine defect. It is of interest therefore to know that Messrs. Smith, Stanistreet and Co., Calcutta, have recently produced a new vitamine accessory food—"Polyvalent Vitamine Compound, or Albegamin" intended especially for administration in labour forces, to coolies on tea gardens or in mines, who are below the due standard of health. This has been prepared as the result of the work of Mr. D. C. Sealy, who is associated with the firm, and who has had considerable experience of conditions on tea gardens. The chief constituents of the accessory food are stated to be germinated gram, calcium morrhuate, casein, glycerophosphates, the Indian molasses or *goor*, and sodium formate.

The experimental data on which the use of this preparation rest have been submitted to us, and are stated to have been briefly as follows:—

Rabbit No. 1.—Weight when caged, 770 gms. Fed on an ordinary cabbage diet.

Weight slowly increased to 990 gms. in 24 days.

Rabbit No. 2.—Weight when caged, 840 gms. Fed on cabbage diet, plus Polyvitamine Compound. Weight 24 days later, 1,080 gms.

Rabbit No. 3.—Weight when caged, 910 gms. Fed only on skimmed milk. Weight dropped to 740 gms. by the 19th day. Now put on to a diet of cabbage, plus Polyvalent Vitamin Compound. Weight increased to 1,020 gms. on the 24th day.

Rabbit No. 4.—Weight when caged 950 gms. Given only polished rice. Weight dropped to 650 gms. by the 22nd day, with definite neuritic symptoms. Now put on to a cabbage diet only. Weight increased to 810 gms. on the 31st day.

Rabbit No. 5.—Weight when caged, 740 gms. An attempt was made to feed this animal on Polyvalent Nutrient Compound only, but the animal disliked this diet, and its weight fell to 650 gms. on the 17th day. It was now given an ordinary cabbage diet, plus Polyvalent Nutrient Compound, and its weight increased to 1,020 gms. by the 24th day.

As far as these data go they would appear to show that the compound may be of considerable value in all conditions of malnutrition, and in convalescence after acute illness. The whole question of avitaminosis with regard to Indian populations is so vitally important that we are glad to see any attempt to put on the market a product that will give a rich and ready and easily assimilable supply of the whole group of vitamins. It only remains to add that the Polyvalent Vitamine Compound is put up in one lb. jars, and that it is on trial at present at the Eden Hospital, Calcutta.

RADIOGRAPHY FOR THE DENTIST.

A LITTLE brochure, which has recently been published by Messrs. Watson and Sons (Electro-Medical), Ltd., Sunic House, 43, Parker Street, Kingsway, London, W. C. 2, as their Bulletin No. 82, under the above title should prove of very great interest to dental surgeons in India. The brochure deals, *inter alia*, with the possibilities of dental radiography; the "Sunic" Mark II dental x-ray unit; which embodies several important new features, and which may be regarded as representing the high watermark of present dental x-ray manufacture—the complete price for the full outfit for direct current being £197-10-0; notes for the beginner on x-rays and their production; instructions with regard to technique for making dental radiographs; the various applications of x-rays to dentistry; and an account of accessories for dental radiography.

The whole brochure is excellently illustrated, and, in addition to price lists, etc., contains much useful information of a general character with regard to dental radiography. Its publication at least shows that British firms are quite as advanced as any others in this new and very important application of radiography.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE Editor, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

Annual Subscription to "The Indian Medical Gazette," Rs. 16 including postage, in India. Rs. 18 including postage, abroad.

Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

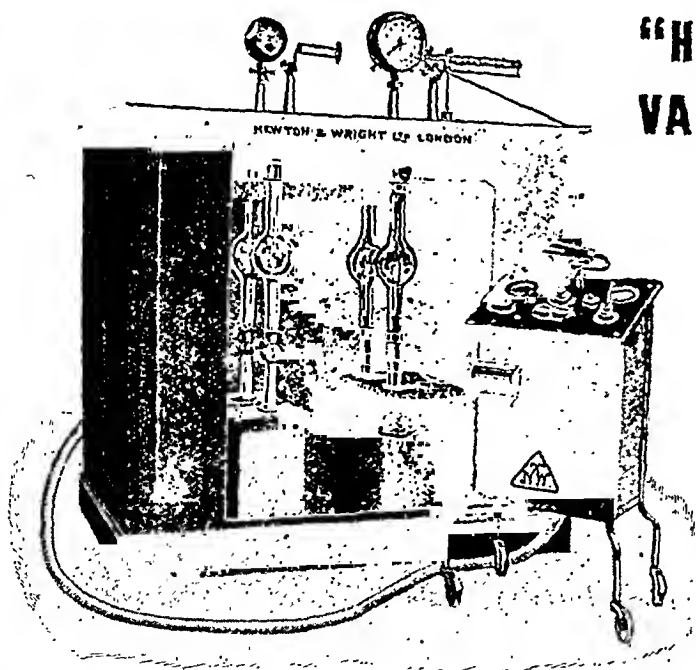
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X-RAY EQUIPMENT



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Original Articles.

THE WASSERMANN TEST IN INDIA. *

By R. B. LLOYD, M.A., M.B., B.Ch.,
 LEUTENANT-COLONEL, I.M.S.,

*Imperial Serologist and Professor of Serology,
 Calcutta School of Tropical Medicine.*

(Being a paper read at the Imperial Social Hygiene Congress held at the Caxton Hall, London, October 3rd to 7th, 1927.)

It is not necessary in these days to emphasise the importance of serological methods in the diagnosis and control of treatment of syphilis. The introduction of laboratory methods has led, as is universally accepted, to a greatly enhanced precision in our methods of dealing with the disease, both in its personal and public health aspects.

Some seven years ago I took charge of the office of Imperial Serologist, Calcutta. That laboratory, as part of its work, carries out Wassermann tests for the large majority of the Calcutta hospitals and for others in Bengal.

I thought possibly a brief report as to the value of the Wassermann test under Eastern conditions might be of interest to this Conference. As is well known, the Wassermann reaction is not a specific reaction in the bacteriological sense, and *a priori* some positive reactions in non-syphilitic conditions might be expected. In Europe the occasional positive reactions reported in non-syphilitic conditions have not been found at all to militate against its enormous value in diagnosis and control of treatment.

In India, where the bulk of the hospital population are illiterate, patients are usually unable to give anything approaching an accurate history as to when the malady commenced or its development. They seldom come to hospital early. When they do come, the characters of the primary lesion are frequently over-shadowed by subsequent septic changes which make opinions based on clinical examination extremely fallacious. This is even more true in the case of female patients who will seldom come to hospital early unless troubled by some painful lesion. It is evident then that a Wassermann test, provided its specificity be as great in the East as in the West, is of even greater value in the routine management of such cases than it is under the ordinary conditions of Western practice.

Though I am not a clinician, it may be useful to mention a few general facts regarding syphilis in Bengal. The disease is extremely prevalent. In its appearance it is somewhat benign, and extensive destructive lesions are the exception. In many instances the primary sore is not characteristic, and may show no induration. Sores frequently assume a phagedænic form. Many are no doubt double infections. These sores are usually swarming with spirochætes. Secondary

rashes are very little in evidence in skin clinics, and secondaries generally are insignificant or suppressed. Condylomata are however very common. The later lesions of syphilis are very noticeable in the wards of the Calcutta hospitals. For the most part these take the ordinary forms seen in the West. Grave cardiac lesions are frequent. Nervous lesions are prominent, especially a specific hemiplegia and transverse myelitis. Para-syphilitic conditions, as is well known, are very seldom seen. Many cases of anæmia in young men are met with with a positive Wassermann reaction. These do very well on anti-syphilitic treatment.

In regard to the specificity of the Wassermann reaction in the East it is clearly essential to examine the reaction in the common tropical disorders.

In endeavouring to arrive at a conclusion as to whether any non-syphilitic condition yields a positive Wassermann reaction we have first to examine a large series of such cases, and then to consider how many of the positive reactions may be attributed to co-existing syphilitic infection. In this an accurate history is very valuable. This is ordinarily quite unobtainable under Eastern conditions. Another method available is to examine the effect of anti-syphilitic treatment upon such positive reactions occurring in non-syphilitic conditions. A third method is to compare the percentage of positive reactions found in the clinical condition under investigation with the average syphilis rate of the community under examination. Wassermann surveys have not been made as yet in India on any extended scale, but from evidence of various kinds it is generally believed that the syphilis rate of the Calcutta hospital population is somewhere in the neighbourhood of 15 per cent. to 20 per cent. In the absence of accurate histories, the problem as to how far positive Wassermann reactions in non-syphilitic conditions are due to associated syphilis has therefore to be solved by a combination of methods two and three. A factor of very great importance in the elucidation of this problem is that the Wassermann test is not at present capable of standardisation into one fixed technique. The result of this is that results obtained by one method are not comparable with others, especially when wide variations in technique occur. An extreme instance of this is the use formerly of non-inactivated sera, which will yield many false positives.

Firstly, malaria. The question as to whether malaria will yield a positive reaction cannot perhaps be regarded as entirely settled. Personally I am strongly of opinion that, provided a Wassermann technique be used which conforms to modern requirements, the reaction will not be positive if the patient be free of syphilis. On the whole the literature indicates that this is so. There are however a few reports by competent workers using good methods which seem to show

* Published, with slight alterations, with full acknowledgements to, and by kind permission of the British Social Hygiene Council.

that in a few persons subject to relapsing malaria normally possessing a negative Wassermann reaction the reaction may become positive during a malarial paroxysm. One cannot however altogether exclude the possibility that these patients had had syphilis previously and that the ensuing malarial attack exerted a provocative effect upon the negative blood reaction.

The practical aspect of this question is for the serologist to determine by the method which he himself uses if malaria gives a positive reaction. I am quite confident that the method used in my laboratory does not yield a positive result in malarial cases, whether febrile or otherwise.

It is unnecessary to say more than a word regarding yaws, which, though a common disease in many parts of the East, is rarely met with in Bengal. In generalised yaws the Wassermann reaction is positive. This is of no great importance clinically as yaws is easily recognised. Even if it were not, the error would not matter very much as the treatment is the same.

Leprosy is the one disease which is non-spirochætal in origin in which a high percentage of positive Wassermann reactions is found. In association with my colleague Dr. Muir of the Calcutta School of Tropical Medicine, I have made an extended enquiry into this question; comprising an examination of over a thousand cases. We first of all attempted to decide whether leprosy was a sequela of syphilis. We find that the Wassermann positive percentage in the early stages of both the dermal and neural types of leprosy is approximately 15 per cent., a figure which is within the estimated syphilis rate of the community. We conclude accordingly that syphilis is a factor of no importance in determining the incidence of leprosy. Twenty-one of these Wassermann-positive early cases of leprosy were subjected to anti-syphilitic treatment; and in every case the reaction became negative. We deduce from this that all these Wassermann positives were due to associated syphilis, and that therefore the leprosy process, at any rate in its early stages, does not produce reagins which will lead to fixation of complement. In the later stages of skin leprosy the matter is not quite so simple. Here we find a high proportion of positive Wassermann reactions (40 per cent. to 60 per cent.); a proportion which is two to three times the estimated syphilis rate in a disease which, in its earlier stages, shows no evidence of special association with syphilis. Thorough anti-syphilitic treatment of thirty-eight of these advanced cases abolished the positive Wassermann reaction in twenty-eight, approximately 75 per cent.

Presumably then three-quarters of these positive reactions in advanced cases are due to associated syphilis. How are we to explain these results? We have ample clinical evidence that the presence of syphilis has a disastrous effect on a case of leprosy. A mild case of leprosy when complicated with syphilis tends rapidly to assume

a grave form; and Dr. Muir and I are of opinion that this explains why the grave cases have a positive blood reaction in a far higher proportion than the early cases. In ten cases treated (25 per cent.), we found the Wassermann reaction resistant to anti-syphilitic treatment. Some of these are no doubt the so-called Wassermann-fast cases of syphilis. But we believe there is another factor, as there is evidence in leprosy of a peculiar serum change which may lead to non-specific reactions when what may be termed "ordinary" Wassermann techniques are employed. Dr. Muir is strongly of opinion that before instituting anti-leprotic treatment, the ground must be cleared by the removal of the co-existing syphilis if present; as otherwise such cases fail to respond properly to the leprosy-treatment. This view involves the serological examination of the blood of every leper before treatment is commenced. This is now done as a routine in Calcutta.

It is essential to devise then a serological test for syphilis adapted to the particular case of leprosy. What may be termed "ordinary" Wassermann methods, good in every other particular, will apparently always yield in leprosy, in addition to those positives caused by associated syphilis, some positives due to experimental factors. The reason for the latter is hard to determine, but it has been found by Kolmer that these non-syphilitic positives are eliminated by the use of his new Wassermann technique, an essential feature of which is the wide gap between the antigenic and anticomplementary doses of the antigen employed. It would seem therefore that the question as to whether leprosy will yield a positive Wassermann reaction is settled in the negative, provided syphilis be absent and a wide gap Wassermann technique be used.

As we find a preliminary serological test for syphilis to be essential before instituting anti-leprotic treatment, we should therefore use Kolmer's technique if the Wassermann test be used at all. We are now, however, experimenting with Kahn's flocculation reaction for this purpose; and up to the present the results have been satisfactory.

In connection with pregnancy, my experience has been that, excluding yaws and leprosy, a strongly positive Wassermann reaction occurring in this condition is certain evidence of the presence of syphilis. There is apparently a tendency to weakly positive reactions in pregnancy, apart altogether from syphilis. Some weakly positive reactions may, however, be connected with syphilis, which, as is known from clinical and experimental evidence, tends to assume a latent form in the pregnant patient, particularly apparently if the pregnancy and the syphilis commence concurrently. These weakly positive reactions would be reported by the laboratory as doubtful, and no harm would be done. It is interesting to note that Smith, using Kolmer's and other methods, found not a single positive reaction in ninety-four women in the last three weeks of gestation.

Presumably then in pregnancy as in leprosy the wide gap technique excludes what I may term non-specific positives. We know that there are changes in the blood in pregnancy, apart from disease. I have noticed a tendency to jellification of the pregnant serum on the addition of formalin, which is absent in normal sera. This raises again the question of the possible connection between the Wassermann reaction and the jellification by formalin.

The fact that a strongly positive Wassermann reaction occurring in a pregnant patient is, with the exception of leprosy and yaws, certain evidence of syphilis has naturally an immediate application to ante-natal work. It is also important in the investigation of diseases of unknown aetiology occurring during pregnancy. An important disease of this class, about which very little is known, is the anemia of pregnant women met with in Bengal. This is a very fatal disorder. In seven cases in which I examined the blood, the Wassermann reaction was strongly positive in five. Dr. Margaret Balfour, who is working on this disease in India, has followed up this idea, and in opening a discussion on the subject recently in Bombay she described the clinical and pathological features of the disease and stated:—"less than half of these patients' serums were positive to the Wassermann test." It would appear from this, however, that syphilis may be the basis of some of these cases.

An outstanding feature of tropical medical cases is the frequency of mixed infections. The serologist in the East would do well always to bear this in mind, and to adapt his Wassermann technique to this end; particularly in the matter of employing antigens with a wide gap between the antigenic and anticomplementary doses as recommended by Kolmer, when it is probable that less will be heard of positive Wassermann reactions in non-syphilitic conditions.

Another important application of the Wassermann test in India is in connection with blood transfusion. Some four years ago I introduced blood grouping tests into Calcutta, and blood transfusions are now frequently given for the conditions familiar in the West. This mode of treatment is also being extended to tropical conditions, e.g., kala-azar and certain of the anæmias. Leaving aside blood group determinations with which we are not concerned now, the blood of every proposed donor is examined in my laboratory by the Wassermann reaction. If the reaction is positive, the donor is of course rejected. If not positive, the question arises:—Is a negative Wassermann reaction proof of the absence of syphilis? Of course we know it is not. If it is not proof of the absence of syphilis, can we say that a person with a negative Wassermann reaction will not convey syphilis? No, we cannot say this either. The recipient must accept the risk of the communication of syphilis by transfusion. Every endeavour is made to reduce to a minimum the risk of infection by the use of an apparently absolutely healthy Wassermann-

negative donor. More than this is impossible. When time permits it is very important to perform the Wassermann test immediately before the donor is used, as although all donors are previously tested and known to be Wassermann-negative, the donor might have contracted syphilis subsequent to his first Wassermann test.

In general it may be said that with a good technique the diagnostic value of a positive Wassermann reaction is the same in the East as in the West, except in the case of yaws and leprosy, for which latter disease special arrangements are required.

With regard to the question as to which serological tests are the best for the diagnosis of syphilis in the East, at present I think the Wassermann test is the best. No doubt the technique is complicated, and experience is required in the interpretation of results. Yet in laboratories organised to this end, and with a trained staff performing Wassermann tests every day, this is a matter of no moment. The various precipitation tests are of course simpler to perform, and may have a great future before them. I see no reason at present to substitute them as a routine test for the Wassermann test, which, as performed in central laboratories, is admitted by all to be a weapon of astonishing precision.

From the point of view of organisation, arrangements in India are on the lines advocated by the Medical Research Council in their 1918 Report, i.e., Wassermann work is centralised in major laboratories where trained workers perform the test every day. Experienced physicians in India universally regard the Wassermann test as one of the sheet anchors in diagnosis. It is consequently essential that these tests be performed by a skilled staff, and be absolutely correct technically. The highest efficiency, combined with economy, is secured by the establishment of a few well-equipped laboratories in important centres. This is very convenient for the main hospitals and clinics in the cities. For the reduction of overhead charges and for the widest possible extension of the laboratory work, arrangements are required whereby the blood from patients in rural areas may reach the centre. In countries where centralised venereal clinics are available, the patient necessarily comes to the clinic for examination and treatment. There a specimen of blood is drawn and sent to the laboratory near by, which thus receives a fresh specimen, a very important point to the serologist. In India arrangements have not developed to this extent, and in the rural areas treatment is largely given locally. The physician in charge, when he wants Wassermann tests, has to send the specimens down to the laboratory by post or by special messenger. This works perfectly well for the three cold months in Bengal. During the hot months of the year the arrangement is not quite so satisfactory, though from practitioners prepared to take trouble, perfectly good specimens are frequently received in the hottest weather. The best plan in the hot weather is to send the tubes of blood in a box of sawdust impregnated with ice and salt.

Specimens of blood drawn in the hot weather if kept at air temperature become completely hæmolyzed in about two days, the final stage being a viscid almost chocolate brown fluid, the clot having gone completely into solution. Such specimens are very awkward to work with, and may set solid during inactivation. They are not necessarily highly anticomplementary, though many are so. Serum may also become highly anticomplementary if stale. This is no doubt due to bacterial contamination. Such sera are rejected. Every effort is made to obtain good specimens, fresh if possible, and in no case is a Wassermann result reported unless the controls are perfect. This rapid change in blood specimens in the hot weather is of no importance in the case of town work where the blood can quickly be put into the ice box, but it limits to some extent the application of laboratory work to persons in rural areas, as the blood specimens are apt to go wrong if left two or three days in the post. Blister fluid may no doubt be used for a Wassermann test instead of blood serum, but it is difficult to be sure how far the former represents the latter.

The question as to how elaborate pathological methods can be made applicable to the widest possible extent to persons living in rural areas is one of very great importance in large countries. It would seem that for those diseases requiring expert laboratory work and specialist treatment, the only solution is for the patient to come down to large centres. This is in fact in operation to-day at various special clinics of the Calcutta School of Tropical Medicine. This arrangement is satisfactory from every point of view, but it may eventually have the effect of unduly crowding these clinics. This subject is hardly my province, but I feel sure that in any scheme for the provision of venereal clinics in India the question as to how persons in rural areas are to receive the benefits of modern pathology and specialist treatment is one which merits very careful thought, both in its administrative and technical aspects. In England the bulk of the population is congregated in large towns. In India, on the other hand, over 90 per cent. of the people live in the villages. Venereal diseases are no doubt diseases of the town rather than of the country, and it would be very interesting to perform a Wassermann survey of a few Indian villages, selected to illustrate the prevalence of syphilis in rural areas and how it is affected by migration of the population from the towns. In this way we may hope to obtain some idea as to the magnitude and distribution of venereal diseases in India and the measures necessary to attack them.

GENITAL HYPOPLASIA IN WOMEN.

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HYPOPLASIA of the female genitalia is far more common than is generally recognised. It is often evidenced by the appearance of the individual, before examination or questioning. These

patients are of small stature, the limbs are child-like and the features are small and dull; the hair about the mons veneris is scanty, or it may even approach the male type, extending up to the umbilicus. The normal pad of fat which produces the prominence of the mons veneris is absent, so that the pubis feels very evident. These patients generally have contracted pelvises.

The history of the patient is often characteristic. It is generally of this nature. The menstruation has not appeared until very late, usually at the age of 16 or 17 in European countries, and about 14 or 15 in India. The menses are rather profuse, or it may be scanty, usually the latter. In this connection I would like to point out that menorrhagia may be associated with genital hypoplasia and deficient ovarian activity, often causing sterility. Recently I had the opportunity of seeing a case of this nature. The onset of the periods is often preceded by cramp-like pains, or there may be great pain during the whole of the menstrual period. Clots may occasionally be passed during menstruation. In older women, sterility is generally the rule.

Pathology. The causation of the pain was formerly believed to be due to an effort on the part of the uterus to expel the menstrual lochia, which it was unable to effect, owing to formation of clots, and tightness of the internal os.

This has been found to be untrue, because menstrual blood from such patients will not clot if kept in a test tube for weeks; though blood taken from the patient's veins will clot in a little under average time. All observers now agree that an antitryptic ferment removes thrombin from the menstrual blood and prevents clotting.

The cramp-like pains are due to premenstrual softening of the cervix, which takes place in a cervix where the amount of fibrous tissue is greatly in excess of the normal and in one where the cervix is long.

Symptomatology. The general aspect and development of the patient has been already described. The external appearance of the genitalia is characteristic. The normal pad of fat about the mons veneris is absent, and the pubic hairs are scanty. The labia majora are mere folds of skin, and there is no fat in them. The labia minora are usually small, but may be very obvious, due to the small size of the labia majora.

The vagina is long and tight, the fornices are flattened out, especially the anterior fornix, which therefore forms a poor receptaculum seminis. The cervix is long, conical, hard, with a pin-hole os, which however will admit a probe. The body and fundus of the uterus are small. The uterus is generally found in one of three positions, either acutely anteverted, retroverted, or retroverted and retroposed associated with anteversion. The probe often shows the length of the uterine canal to be normal, owing to the great comparative increase of the length of the cervix, which makes up for the lack of length of the body. The uterus may be displaced to

one or other side of the pelvis, suggesting previous inflammatory trouble. But this is unlikely in a virgin, who is not subject to tuberculous salpingitis. It has been shown to be due to intantilism of the pelvic connective tissue on one side, which causes lateral displacement of the uterus. The ovaries are generally high up and may be palpated with difficulty.

The following complications are often associated with genital hypoplasia. Dyspareunia is common, due to the small vaginal orifice. As the fornices are shallow and flattened, much of the semen is lost, so there is less chance of fertilisation. These two above mentioned factors lead to sterility. If the patient becomes pregnant there is a great tendency to miscarriage, but the prognosis is generally good for the next pregnancy. Labour is slightly premature, and the pains are poor, due to the lack of ovarian hormonal stimulus to the pelvic sympathetic. The babies are often small, and consequently there is not much disproportion. There is a distinct tendency for hyperflexion of the head. Superinvolution of the uterus is common.

Treatment. Whole gland ovarian extract should be administered. In Vienna they use a preparation known as Owowop, five tablets, after meals. Small doses (irritative dose) of X-rays to the ovaries have been used with success. This has been dropped of late owing to the danger of damaging the ovaries, but with proper dosage and in expert hands it is quite safe. Sitz baths, with carbon dioxide to stimulate the skin, are very useful. Instrumental interference with the endometrium causes ovarian stimulation, the mere rubbing of the endometrium with the sound being often sufficient. So dilatation of the cervix is very useful, (Loeb, 40 per cent. cure). The application of X-rays, to the pituitary is much more satisfactory, and quite free from danger; the dose can be repeated in seven weeks. Where sterility persists in spite of the above treatment, the tubes should be tested with Rubin's apparatus.

DIFFICULTIES IN THE DIAGNOSIS OF FEVERS IN THE TROPICS.

By J. C. DE,

MAJOR, I.M.S.,

Police Surgeon, Calcutta.

In the tropics fevers are often puzzling as to their aetiology, and some fevers remain undiagnosed in spite of systematic examinations by clinical and laboratory methods.

The object of this paper is to deal with some fevers which may give rise to difficulties in their diagnosis.

Some of the fevers dealt with may be regarded as uncommon in occurrence.

It is possible that they occur more commonly than is usually supposed.

Some of them are of a mild type and are less likely to be met with in the wards of general hospitals, and more in the out-patient departments

and private practice. Investigation of such fevers by laboratory methods is therefore not likely to be sufficient.

If laboratory methods were as readily applicable as physical methods for the elucidation of fevers in the tropics, it would go a long way towards clearing up the aetiology of many obscure tropical fevers.

The value of laboratory methods in the diagnosis of tropical fevers is well known, but it might be mentioned that it is also important to determine correctly from clinical examination the kind of material which is appropriate for examination by laboratory methods for the particular disease, and the nature of the investigations required. Failure in this respect means also failure in respect of results from laboratory investigations.

This point will be illustrated in connection with one of the fevers dealt with in this paper.

For convenience of description the fevers described may be grouped as follows:—

GROUP I.—*Enteric-like fevers.*

GROUP II.—*Atypical enteric fevers.*

GROUP III.—*Other puzzling fevers.*

GROUP I.

Chart (A) is that of a Hindu male, aged 28, who was admitted into hospital on account of fever of three days' duration. The fever came on suddenly, accompanied by chill and headache. It followed a sub-continued course for three days after admission and a continued course for the rest of the week. It then became intermittent and finally normal after four more days.

The total duration of the fever was fifteen days.

During the acute stage of the disease the chief complaints were headache and frequency of movement of the bowels. The motions were chiefly liquid and yellow. During the stage the patient's expression was apathetic and his decubitus dorsal. His tongue was generally clean. Anorexia, sleeplessness, delirium, abdominal distension and a general toxic appearance, were absent. The pulse was not dicrotic, and the pulse-temperature ratio was normal. The internal organs showed no abnormal clinical change. The spleen was not enlarged.

Bacillus faecalis alkaligenes was isolated from his blood, cultured on the ninth day of illness.

A culture from his stool, made later during convalescence, showed an abnormally preponderant growth of *Bacillus faecalis alkaligenes*, being 85 per cent. of the total growth obtained.

Chart (B) is that of a Mahomedan male, aged 36, who was admitted on account of fever of four days' duration.

The fever came on gradually without any marked symptoms. His bowels had been constipated for several days prior to admission. The fever followed a continued course for twelve days after admission. It then became intermittent and finally normal after four more days. The total duration of the fever was twenty days. During the acute stage of the illness the following were the chief clinical features, (1) his decubitus was

dorsal, (2) expression apathetic, (3) sleeplessness very marked, (4) slight diffuse bronchitis present, (5) spleen enlarged one finger's breadth below the costal margin, (6) pulse-temperature ratio high. The important negative features were (1) tongue not dirty, (2) pulse not dicrotic, (3) abdominal distension, delirium and a general toxic appearance were absent.

Bacillus faecalis alkaligenes was isolated from his blood, cultured on the seventh day of illness. His bowels were inclined to be constipated throughout.

The two cases described resemble in several respects a fever of the typhoid group.

(3) Any marked signs of toxæmia were absent.

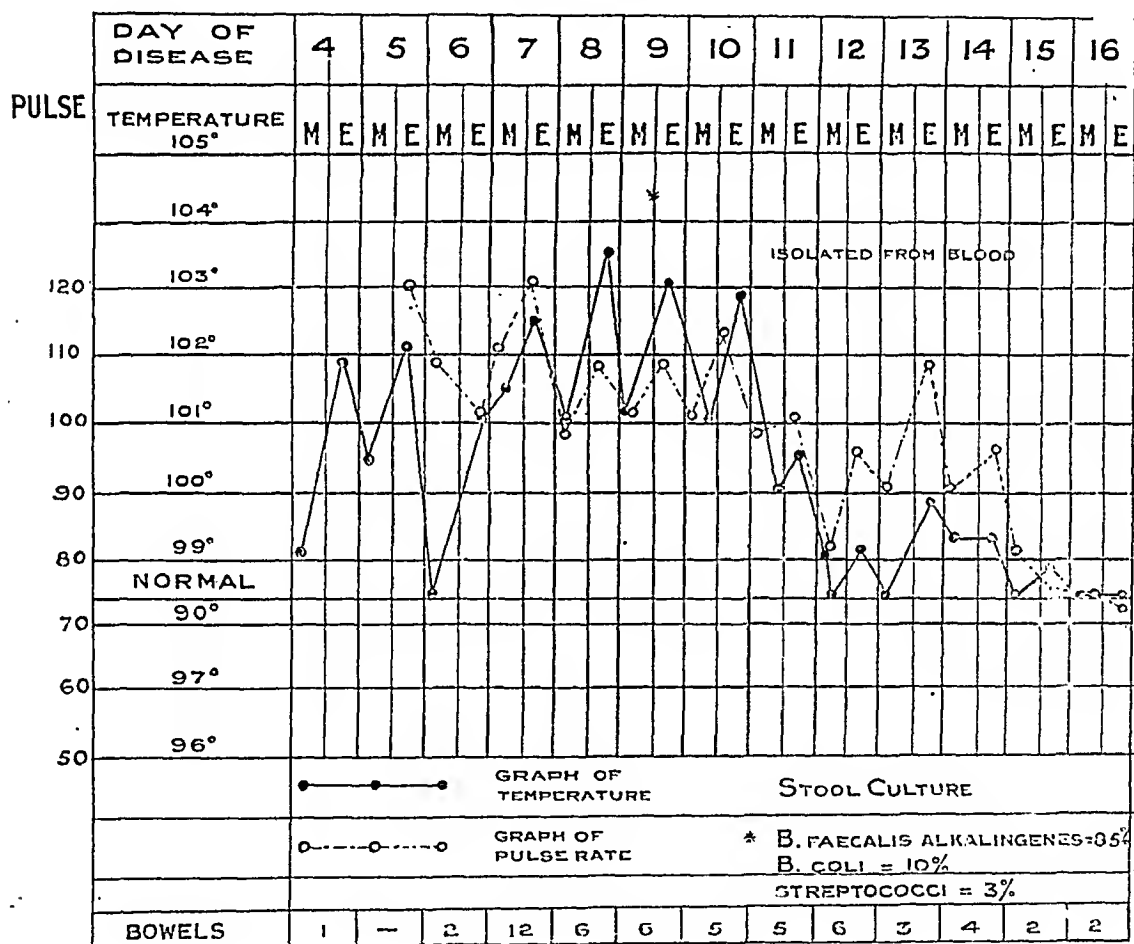
Chart (C) is that of a Mahomedan male, aged 26, who was admitted into hospital on account of fever which came on suddenly the day before.

He gave a history of having been knocked down by a cab five days previously which had caused an abrasion on the lower part of the left side of the chest. This injury was attended to in the out-patient department.

He appeared, at the time of admission, much prostrated and complained of a good deal of headache.

His tongue was coated on the dorsum and rhonchi were audible over the greater part of the

CHART - A



In the first case the continued type of pyrexia, earlier headache, later apathy, and looseness of the bowels were indicative in this direction.

In the second case the slow onset, a typically continued type of pyrexia of a duration more common to fevers of the enteric group, apathetic expression, sleeplessness, bronchitis, and the enlargement of the spleen were even more closely indicative in this direction.

The chief clinically important differences, in both cases, were

(1) The pulse-temperature ratio was either normal or high.

(2) The pulse did not show any dicrotic change.

chest. His spleen was not enlarged and there were no other special findings at the time.

The headache persisted from day to day and on the twelfth day of illness some stiffness of the neck was noticed. By the sixteenth day he had become stuporose and mildly delirious and sordes had appeared on the teeth, also jactitation of the upper extremities, some stiffness of the lower jaws, and a fairly marked Kernig's sign. The pulse-temperature ratio remained low throughout the greater part of the illness.

The fever showed a continued and a gradually ascending course during the first week after admission; it remained moderately high with

fluctuations during the second week; and became intermittent and finally normal during the third.

The total duration of the fever was twenty days.

Bacillus pyocyaneus was isolated from his blood cultured on the eighth day of illness, and from his cerebro-spinal fluid cultured on the sixteenth day of illness.

The cerebro-spinal fluid was under moderate pressure, faintly opalescent to the naked eye, showed a narrow ring of albumin with the cold nitric acid test, and microscopically a number of catarrhal cells and an actively motile bacillus.

Lumbar punctures were repeated as required to relieve nervous symptoms.

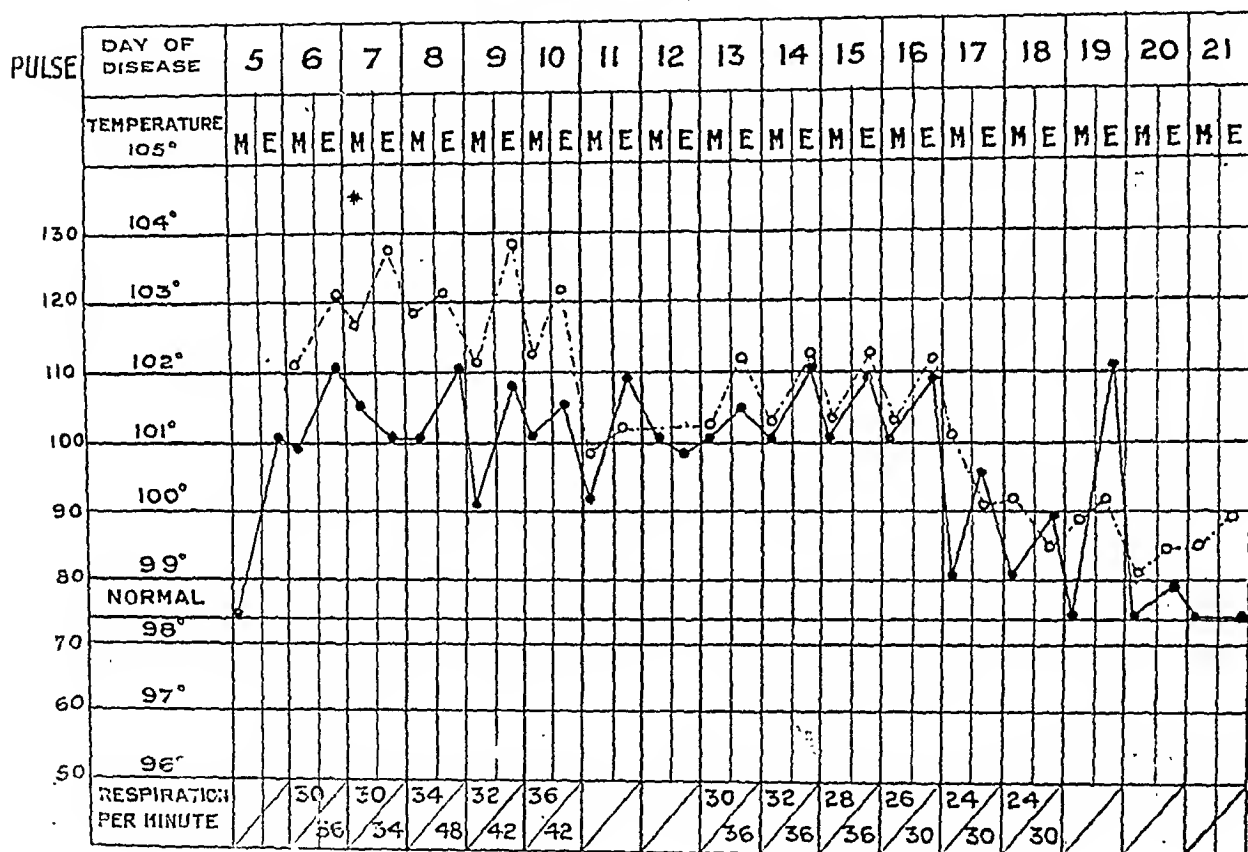
and partly open lips, showing dark brown lines of sordes on the front upper teeth, and twitching movements of the hands suggestive of idle picking at the bed clothes, made up a picture strikingly like that of one suffering from a severe attack of typhoid fever at a similar stage of the disease.

Chart (D) is that of a Hindu male, aged 28, who was admitted into hospital on account of fever. He had been suffering from periodical attacks of fever for about 2 to 3 months prior to admission.

The fever followed a sub-continuous course for eight days and then became normal.

His general health was poor, signs of diffuse bronchitis were present in the chest, and his spleen

CHART - B



● — — — — — GRAPH OF TEMPERATURE

○ — — — — — GRAPH OF PULSE RATE

* *B. FAECALIS ALKALINGENES*

ISOLATED FROM BLOOD

The Widal reaction of his blood serum carried out on the 21st day after the commencement of illness by Dreyers' standard method was negative to typhoid, and paratyphoid A and B bacilli in a dilution 1:25. The man made an uninterrupted recovery.

Apart from being an unusual type of septicaemia, the further interest of the case lies in the close resemblance existing between its course, clinical features, and type of pyrexia and that seen in typhoid fever.

During the second week of illness the patient, as he lay flat on his back with a heavy look on his face, muttering in delirium, with dry, cracked,

was enlarged two finger-breadths below the costal margin, rounded and soft.

No malarial parasite was found in blood films of his peripheral blood, and no tubercle bacilli in his sputa.

The blood count showed the white cells reduced to 3,000 per c.mm. of blood, and the differential count was as follows:—

Polymorphonuclears	..	54 per cent.
Small mononuclears	..	38
Large mononuclears	..	8
Eosinophiles	..	0

The formol-gel test of his blood serum was (±)

Herpetomonad flagellates were isolated from his blood on special culture.

While dealing with these continued type of fevers, it may be appropriate to indicate here other fevers of the same type which, on account of their indefinite clinical features, are apt to be diagnosed, though incorrectly, on the basis of a predominant clinical sign, as malaria, bronchitis, influenza, etc., or in the absence of such signs styled "pyrexias of uncertain origin," a term which is in itself obviously an inaccurate one.

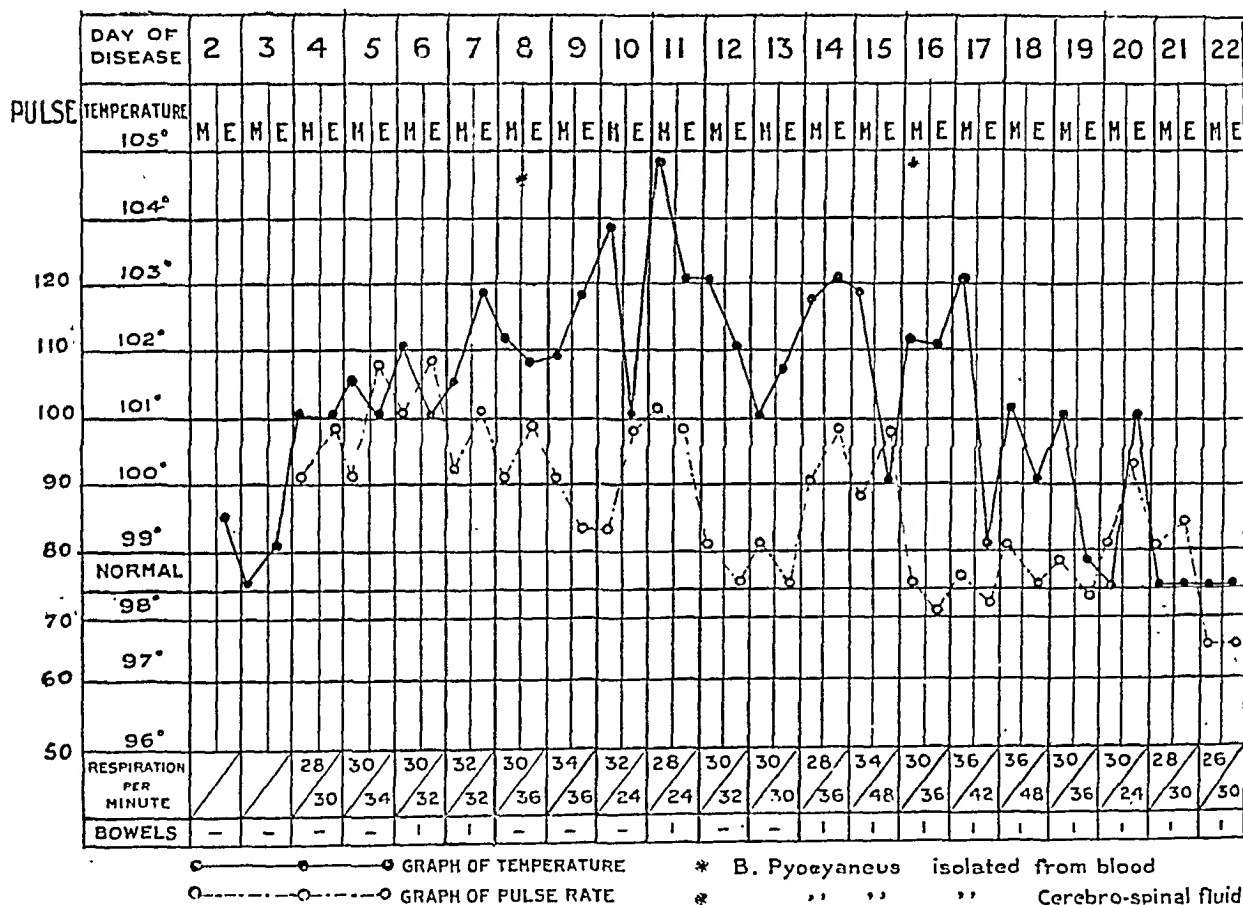
Chart (E) is that of Mahomedan male, aged 26, who was admitted into hospital on account of fever which had come on the previous day with

Exhibition of quinine failed to produce any effect on the temperature.

A culture from his blood, made on the 8th day of illness, proved sterile, and a culture from his urine made on the 12th day of illness yielded a heavy pure growth of *Streptococcus viridans*. His sputum was collected on the 12th day of illness. It was muco-purulent in character. No tubercle bacilli were found in films made from this collection.

The signs of diffuse bronchial catarrh persisted after the temperature had returned to normal, and another sample of sputum was collected and examined and this time a number of tubercle bacilli

CHART - C



rigor. He had served for about seven years as a police constable. He had occasional attacks of fever which were quickly recovered from, but he had never felt ill enough to go into hospital.

His general health was fair. His spleen was enlarged two finger-breadths and liver one finger-breadth below the costal margin. The heart was normal, the lungs showed signs of diffuse bronchitis and prolongation of expiration.

Cough was not complained of nor noticeable. The fever, after fluctuating for two days, settled down to a continued course for seven days and fell to normal by lysis on the 12th day of illness. The pulse-temperature ratio during the febrile period remained low and the frequency of the respirations high.

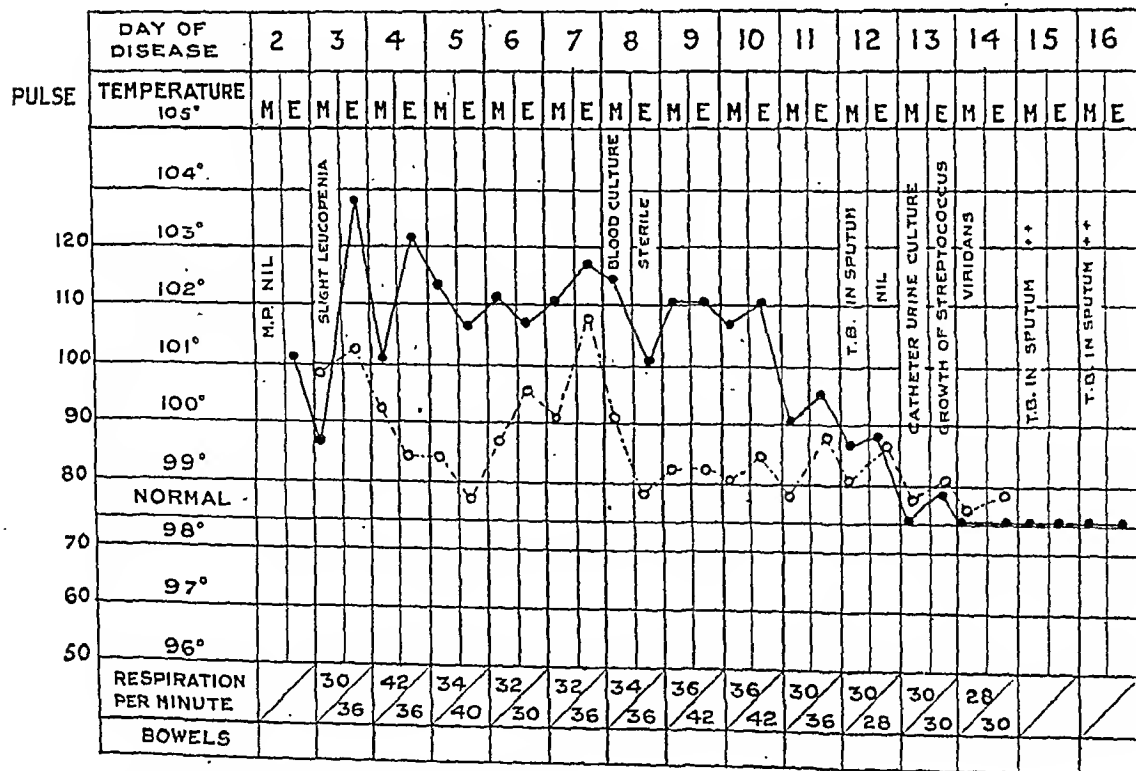
were found in the smears made and were found again in fresh samples taken two days later.

The patient remained for some time afterwards in hospital, and 27 days after admission coughed up a little blood. Soon afterwards signs indicative of breaking down were distinguishable at the apex of the right lung.

The manifestation of pulmonary tuberculosis as an acute febrile illness of the typhoid type is by no means uncommon. The clinical resemblance of fevers of the typhoid group is remarkably close. In the case quoted above the diagnosis remained doubtful until tubercle bacilli were found in the sputum. I have come across several cases of this kind. In some cases the presence of a slight blood tinge in the sputum

DAY OF DISEASE		3	4	5	6	7	8	9	10	11	12	13	
PULSE	TEMPERATURE	M	E	M	E	M	E	M	E	M	E	M	E
	105°												
	104°												
	103°												
	102°												
	101°												
	100°												
	99°												
	NORMAL												
	98°												
	97°												
	96°												
	50												
	RESPIRATION PER MINUTE		20 20	24 30	24 28	24 28	24 26	24 26	22 26	22 24	22 24		
	BOWELS	-	1	4	-	1	1	1	1	1	1	1	

CHART - E



● — — — — — ● GRAPH OF TEMPERATURE
○ - - - - - ○ GRAPH OF PULSE RATE

drew attention to their possibly tubercular origin. In others no indications in this direction were available from the

characters of the sputum. Tubercle bacilli have been found in sputa entirely mucoid in character. In some cases where there was hardly any ex-

CHART.— F

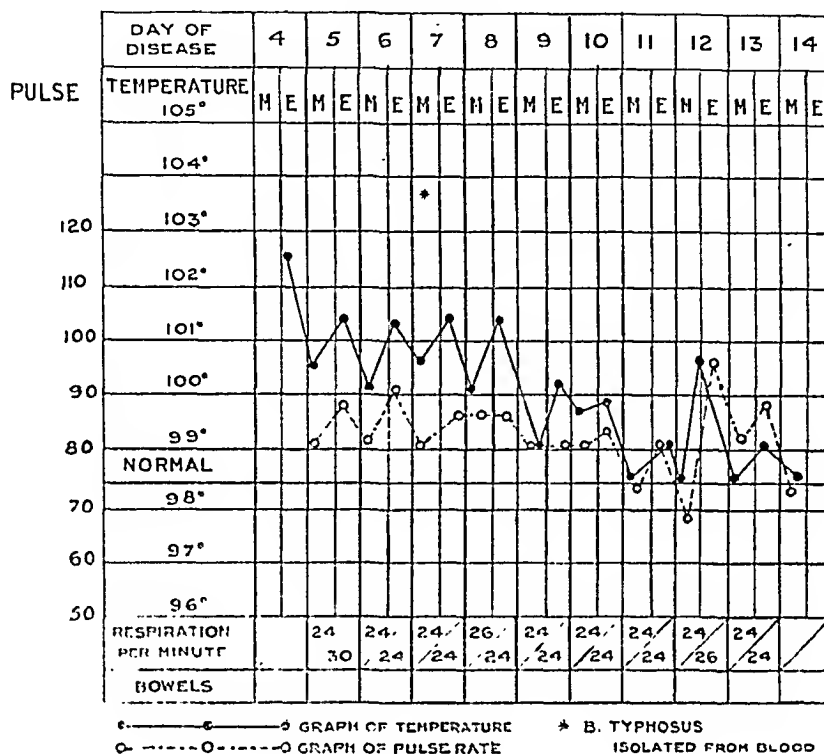
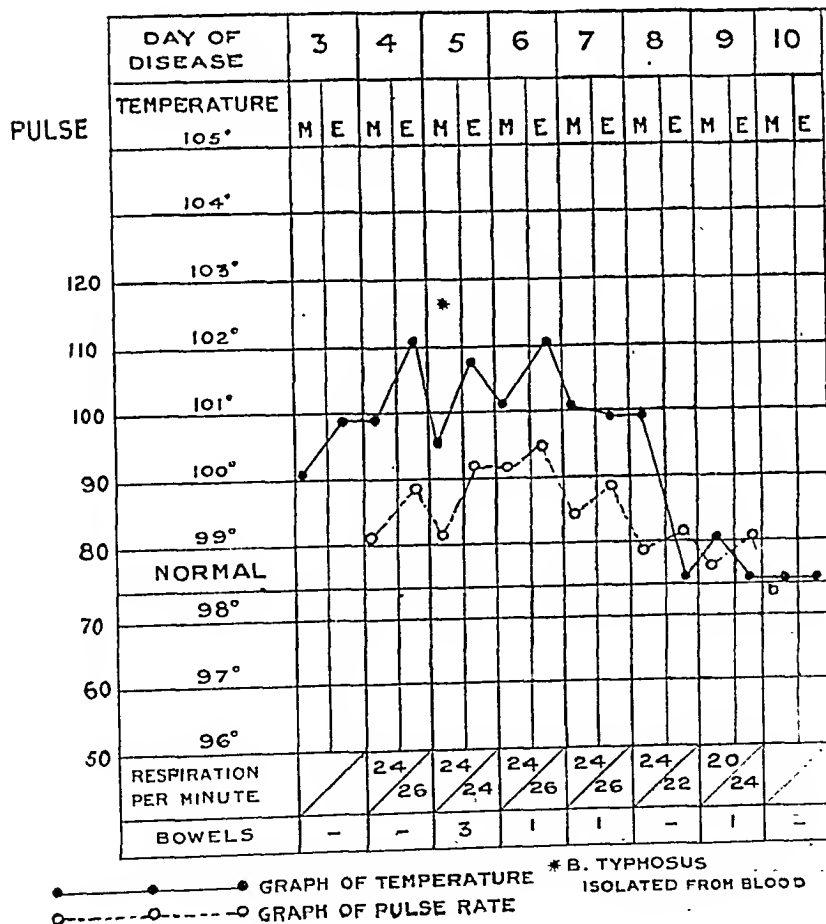


CHART — G



pectoration the examination of whatever sputum was available after giving stimulating expectorants revealed the presence of tubercle bacilli. In many of these cases both the history and signs in the chest were of a very indefinite character. These findings, I think, show the importance of excluding by examination of the sputum the possible tubercular origin of acute fevers of the typhoid type where the diagnosis rests on clinical grounds, and the help that may be received in this direction from the administration of stimulant expectorants.

Group II.

Whilst fevers of the typhoid group are usually characterised by continuous fever over a long continued period, it is important not to forget the existence of mild and abortive forms of typhoid.

Charts F and G will show how easily the fevers showed therein might be ignored, as not of

Group III.

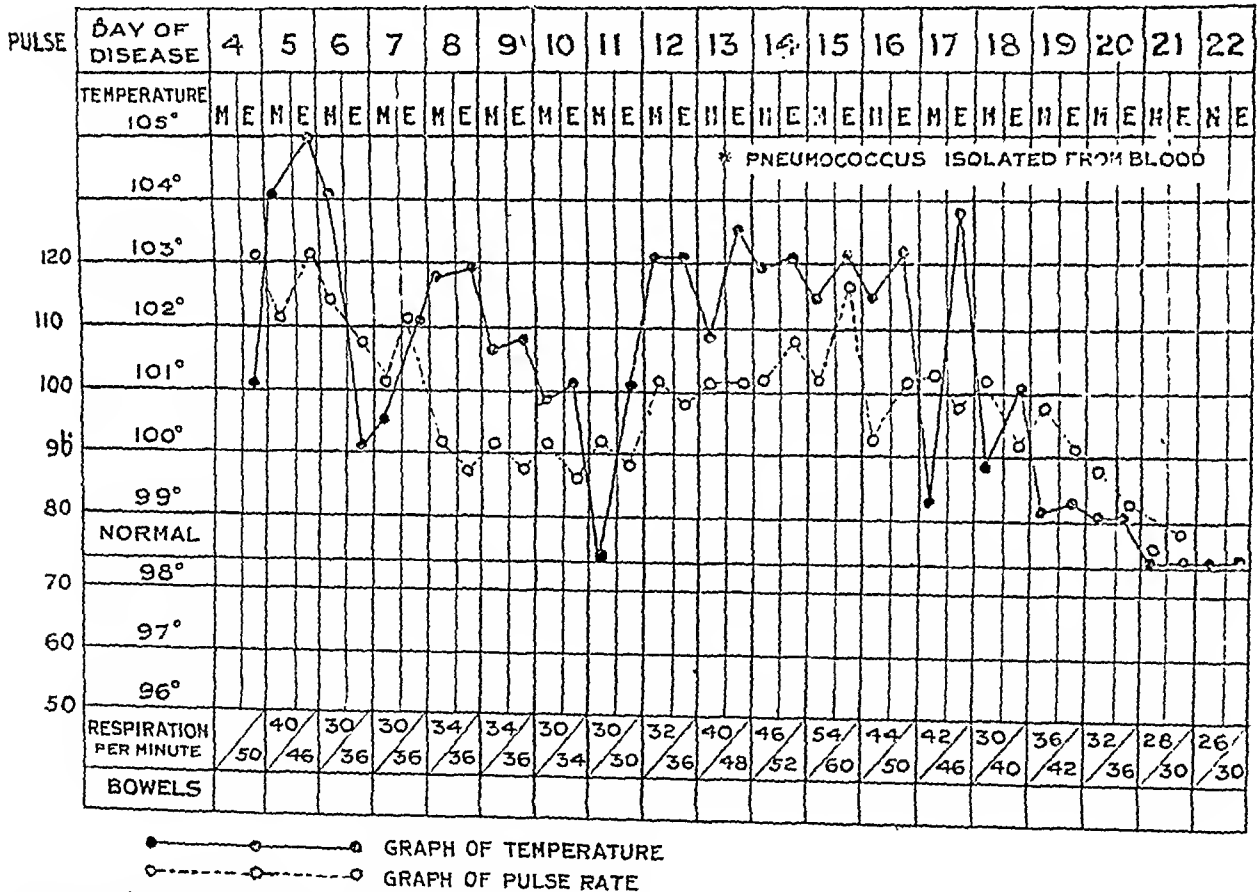
Coming now to other fevers of a puzzling nature, the following cases are of interest:—

Chart H is that of a Hindu male, aged 36, who was admitted into hospital on account of fever of three days' duration.

On examination signs of congestion over the posterior aspect of the upper lobe of the right lung were noted and in a few days' time signs of consolidation were marked over this area. A total white cell count showed a leucocytosis of 16,250 per c.mm. of blood. The fever maintained a continued course for seven days after admission and then touched normal without any marked critical signs. It rose again, however, and maintained a steady continuous course for the next five days.

As the temperature remained up till the 13th

CHART — H



any material consequence, or diagnosed as seven day fever, bronchitis, etc.

The importance of a correct diagnosis lies not only with regard to prevention of spread of infection from an undetected typhoid convalescent acting as a carrier, but also in guarding the individual from a relapse. I have known relapses to follow through too early a resumption of ordinary diet in a person convalescent after typhoid fever, in whom the true nature of the first attack was not realized. Such relapses are usually more severe than the original attack and may even prove fatal.

day of illness and there was no sign of involvement of fresh areas of the lungs, a blood culture was made and the pneumococcus was isolated from the blood. The temperature finally became normal on the 21st day of illness.

The pneumococcus, in the majority of cases of pneumonia, may be isolated from the blood during the first few days of the disease, but the persistence of the organism in the blood stream in the later stage of the disease seems to show that in this case it was more a systemic than a local invasion which was concerned in maintaining the fever for over twenty days.

Chart J is that of a Mahomedan male, aged 35, who was admitted into hospital on account of fever which had started suddenly with rigor, 2 days previously.

On examination a few scattered râles and

rhonchi were noted in both lungs, the spleen was not enlarged, and the tongue was fairly clean.

No malarial parasite was found in his peripheral blood films. The total white cell count was 11,600, per c.mm. of blood. *B. coli* was isolated

CHART - J

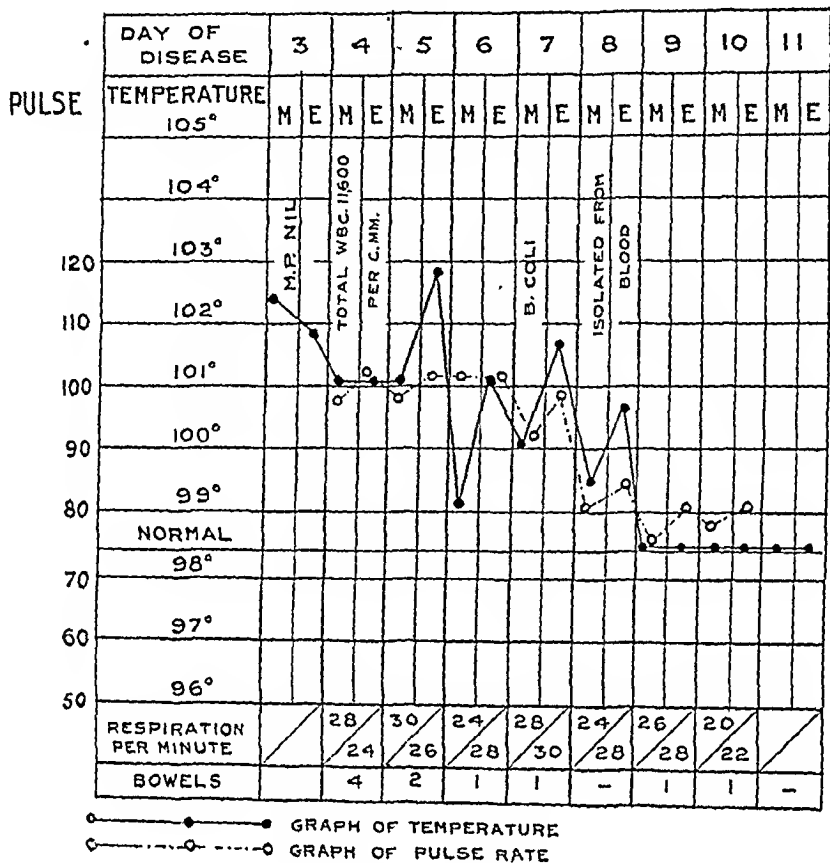
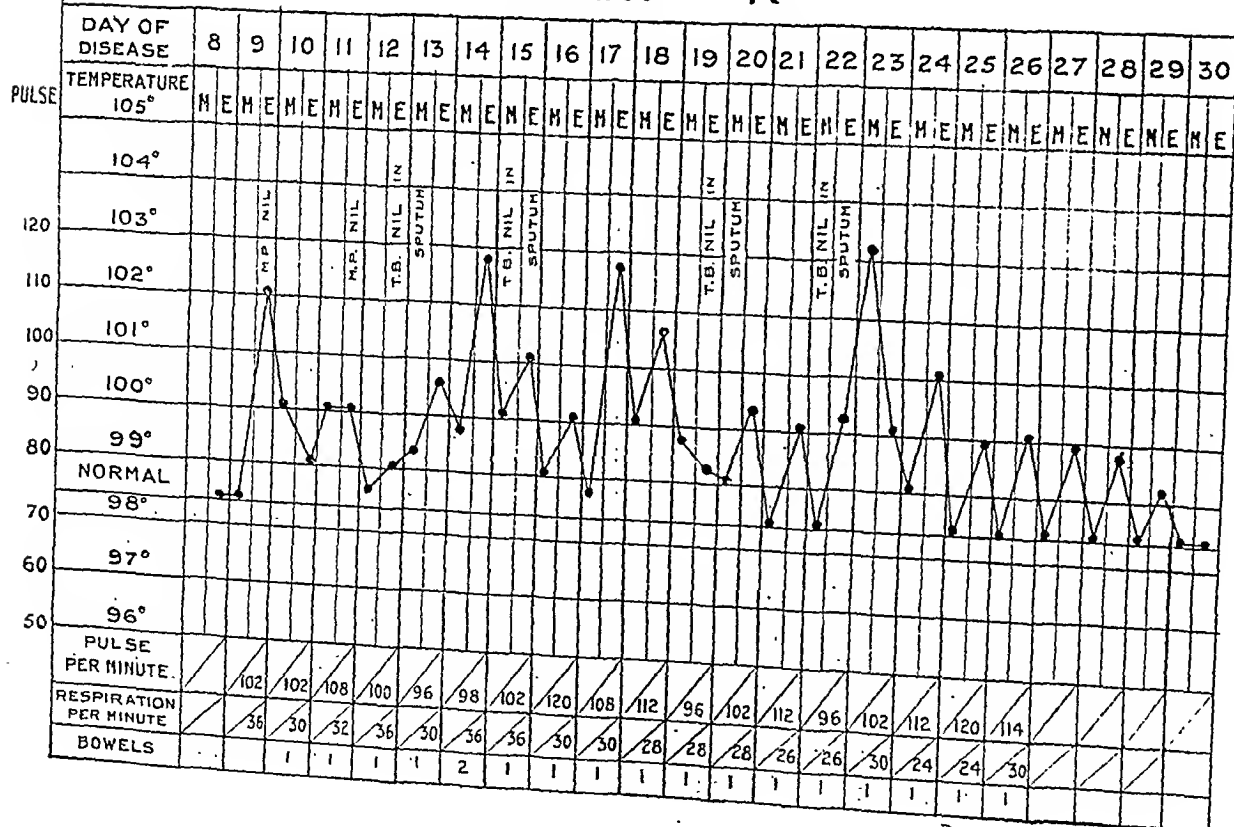


CHART - K



from his blood on culture. The rises and falls of temperature were marked by chills and sweatings, and thereby simulated an attack of malaria.

Coming now to intermittent types of fevers, the following cases will illustrate how mistakes may arise in the matter of diagnosis.

Chart K is that of a Hindu male, aged 32, a Nepalese who was admitted into hospital on account of fever and cough of about a week's duration. He had not been in good health for some time previously.

He was wasted, anæmic, and had a sallow complexion.

On examination of the chest the lung note was found considerably impaired over the whole of the posterior surface of the left lung and to a less extent over the corresponding surface of the right. Rhonchi and râles were audible throughout both the lungs. Pain on inspiration was complained of over the right mammary and axillary regions of the chest and friction sounds were audible over these areas. The spleen was slightly enlarged and the heart slightly dilated. An increased sense of fullness was felt in the right half of the epigastrium and was ascribed to dilatation of the right side of the heart.

The upper border of the liver dullness was marked by the impaired note over the greater part of the right lung, and the lower border was not palpable under the costal margin. The stools and urine were healthy.

After malaria had been excluded, attention was concentrated on the sputum which was repeatedly examined for tubercle bacilli. Meanwhile the patient continued to run a quotidian, almost a hectic type of temperature with chills, rigors, and sweatings. Towards the end of the 3rd week after admission, he started to complain of pain in the right shoulder. The attention was then redrawn to the liver. A definite tender local swelling of the organ could now be felt in the right half of the epigastrium and on further search of the stools cysts of *Entamoeba histolytica* were detected in these. He was sent to the Medical College Hospital with a diagnosis of liver abscess. He was treated there with injections of emetine hydrochloride and made a good recovery.

Chart L is that of a Hindu male, aged 32, who was admitted into hospital on account of fever of 3 days' duration. The onset of the fever was sudden and accompanied by rigor, headache, and vomiting.

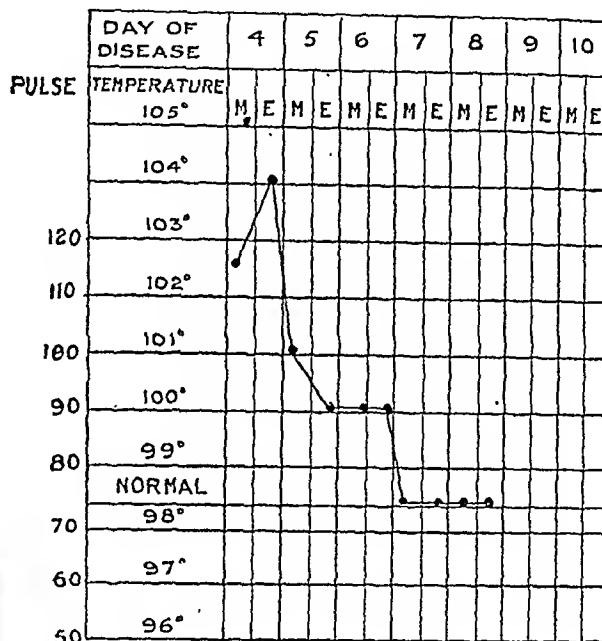
On admission he was restless, and his eyes were injected. The percussion note over the base of the right lung was somewhat impaired and a few rhonchi were both over audible lungs.

The spleen was not enlarged. No malarial parasite was found in blood films examined, but a leucocytosis was noted. A total white cell count showed an increased count of 18,400 per c.mm. of blood. The next day his temperature had fallen considerably and he was feeling much better.

On the 3rd day after admission he complained of a pain in the scrotum. On examination the

skin of the scrotum was found red, swollen, hot, and covered by a vesicular eruption. His finger blood was taken that night and on examination showed a number of microfilaria.

CHART - L



In this case the mode of onset, restlessness, the appearance of the patient suggested first of all malaria. Later, the discovery of marked leucocytosis indicated an inflammatory trouble, probably in the lungs; later still the affection of the scrotal skin led to the discovery of the real cause, viz., a filarial fever.

In conclusion I wish to express my indebtedness to Major G. Shanks, I.M.S., and Dr. T. Sur, Professor and Assistant Professor of Pathology, Medical College, Calcutta, who carried out all the culture work that was required in connection with the cases described. But for their findings in the laboratory, the causes of many of the fevers described would have remained obscure.

THE TREATMENT OF BRONCHIAL ASTHMA WITH *SAUSSUREA LAPPA* (KUTH ROOT).

By R. N. CHOPRA, M.A., M.D. (Cantab.),
LIEUTENANT-COLONEL, I.M.S.,

Professor of Pharmacology, School of Tropical Medicine, Calcutta.

CHOPRA and De (1924) gave an account of the antispasmodic action of the root of *Saussurea lappa* in the treatment of bronchial asthma. This plant belongs to the natural order Compositæ, and is commonly called *Kuth* or *Patchak* in Hindi, *Kushtha* or *Kashmirja* in Sanskrit and *Kust* in Arabic and Persian. It was for long time confused with other species of *Costus*, and also with *orris* root, but Guibourt first suggested the correct

botanical source of this drug and his suggestion was confirmed by the researches of Falconer who visited Kashmir and found that *Aplotaxis lappa* growing there was undoubtedly *Aucklandia costus*, now known as *Saussurea lappa*. It is a tall, very stout herb, with annual stem, heart shaped leaves and thick perennial roots which are dug up in the months of September and October. It grows chiefly on the moist and open slopes of the Himalayas, especially those surrounding the valley of Kashmir and adjacent ranges, at a height of 2,000 to 13,000 feet above the sea level. The best root is grown over an altitude of 9,000 to 13,000 feet. The root occurs in crooked twisted pieces about 3 inches long, $\frac{1}{2}$ to 1 inch in diameter; it is collected and exported to China in large quantities without any further preparation. It is also shipped to the Red Sea and Persian Gulf. The root fetches a very good price, as much as four hundred rupees (£25) being paid for a maund (80 lb.). In China it is chiefly used as an incense, as a spice, and medicinally as a powerful aromatic stimulant, carminative, antispasmodic and in the form of an ointment for external application. It is a very old remedy of the Hindu medicine and has been described in the *Nighantus* as a remedy for cough, asthma, fever, dyspepsia and skin diseases. The Arabian medical writers describe it as a diuretic and anthelmintic, and use it in the treatment of quartan fever and leprosy.

Chemical Composition and Pharmacological Action of *Saussurea lappa*.

The chemical composition and the pharmacological action of the drug have been worked out and the details will be published shortly. It will suffice here to say that the chief active constituents isolated from the root are an essential oil which forms 0.5 per cent. of the root, traces of an alkaloid, a bitter substance of glucosidic nature, and a resin. The most important of these from a medicinal point of view is the essential oil, though the alkaloid and the glucoside may undoubtedly help. The essential oil has a strong, aromatic, fragrant and penetrating odour. It is rapidly absorbed and is excreted into the lungs, and during its excretion produces not only relaxation of the bronchial muscles but also has an expectorant action. An alcoholic extract prepared from the root which contains most of the active principles has been used for therapeutic trials and all our cases in the present series were treated with it.

Causation of Asthma.

In order to appreciate the value of this remedy in the treatment of asthma it will be necessary to say a few words about the causation of this symptom-complex. In previous papers published by the author in collaboration with Lt.-Col. H. W. Acton, I.M.S., on the causation and treatment of asthma, it was

pointed out that three factors are concerned in producing the paroxysms. Firstly there are certain toxic bases which when entering into the circulation produce constriction of the bronchial muscles and turgescence of the mucous membrane. These bases may be of extrinsic origin, e.g., emanations from animals, pollens of various grains, etc., or of intrinsic origin, that is to say produced in the body itself, e.g., toxins produced by bacterial or other infections in the respiratory and gastrointestinal tracts (*E. histolytica* infection), or elsewhere in the body. In the latter group are also included some of the common food-stuffs which bring about asthmatic attacks. It is a well-known fact that two classes of substances whose chemical composition we know give rise to bronchial constriction. (1) Bases formed from disintegration of the protein molecules, e.g., amines and allied bodies which act through the sympathetic. These may be volatile substances, such as trimethyl amines (emanations from animals probably belong to this class), or non-volatile, such as histamine. (2) Alkaloids such as pilocarpine, physostigmine, arecoline, etc., which act through the vagus.

The second important factor in asthma is the defensive mechanism of the body against these poisonous bases. This consists in increase in the leucocytes, mainly in the eosinophiles which may be as high as 80 to 90 per cent. Eosinophilia is an indication of the circulation of these poisonous bases in the blood-stream and is often considered to be a sign of irritation of the vagus. The detoxicating action of the liver is a very important factor in the food poisoning group when the poisons are coming directly to this organ from the intestine. The activity of the endocrine organs must necessarily play a very important part. If the liver is functioning properly and the action of the endocrine glands is normal, the poisons that are coming into the system are controlled by this combined defensive mechanism. When this mechanism breaks down, it is only then that these bases can exert their baneful effects on the bronchi and produce asthma as well as give rise to eosinophilia. Acton and Chopra have shown that epinephrine in 1 : 1,000,000 dilution can prevent the contraction of the isolated guinea-pig uterus caused by a 1 : 100,000 dilution of such a strong base as hordenine, and probably similar phenomena occur in the body.

The third factor to be considered is the tonus of nerves that receive the stimulus of the poison. The tone or equilibrium in the body is kept up by the protoplasm of the cell, the most primitive tone, and secondly by the individual tone of the vagus and sympathetic. In this way an elaborate system of balance is kept up which is not easy to upset except in disease. Variations in tone may occur in either of the two systems, as hypo- or as a hyper-activity. Bauer has observed that

normally during sleep there is a physiological vagotonia. This hyper-activity of the vagus is shown by contraction of the pupils, slowing of the pulse, and a tendency to perspire. This fact probably partly explains why labour pains and attacks of asthma usually occur during the night. Another reason is that during sleep waste products are not eliminated by the urine and faeces and moreover after the main evening meal the amino-acids, etc., produced by the digestion of proteins reach the large intestines 4 to 6 hours later, where they are further broken down by the bacteria into poisonous bases. These two factors probably account for the attacks which occur about 3 o'clock in the morning. In view of these facts, the attempt has been made to classify asthmatic patients according to the predominance of the vagus or sympathetic systems, but in practice, while one does sometimes come across cases of simple vagotonia and sympathicotonia, by far the largest majority of patients belong to the type of hyper-excitability of both the systems. Thus in a case of sensitiveness to a particular food the repeated attacks render the patient more liable to attacks of bronchitis, and this in its turn leads to the development of sensitiveness towards the causative bacteria. Again, irritation by vagotonia produces asthma and ill-health, then perhaps sensitiveness develops towards some food-stuffs.

Saussurea lappa in the Treatment of Asthma.

It will be seen, therefore, that not only do different cases of asthma react differently to different toxins which may gain access to the circulation, but their reactions to different remedial measures also differs. This makes the treatment of this symptom-complex a difficult matter. Every case should be treated on its own merits. The cause giving rise to attacks should be discovered and remedied, but this often is no easy matter and may take a considerable time. In this connection the reader is referred to the papers by Acton and Chopra (1923 and 1925) in the *Indian Medical Gazette*. Without due attention to it, however, permanent cure cannot be expected and eradication of the causal factor should always be kept in view in the treatment of this condition. The first consideration, however, in most cases is the symptomatic treatment, so that while the causal factors are being investigated the patient is kept free from paroxysms. During the last few years we have had the opportunity of studying a large number of cases of asthma and have tabulated some of our results in Table I.

It will be seen that a large number of asthma patients one meets with in this country, although suffering from the hyper-excitability of both the systems, show a greater degree of irritation of the vagus than of the sympathetic. The action of the vagus is increased owing to certain causes,

not only producing spasm of the bronchial musculature but also vaso-dilatation of the bronchial mucosa, which give rise to attacks of asthma. These effects can be relieved by atropine and to lesser degree by inhalation of fumes of stramonium, tobacco leaves, etc., which diminish the vagus action, or adrenaline, ephedrine, etc., which stimulate the antagonistic action of the sympathetic. In the vagal predominance adrenaline has only a slight and evanescent effect in overcoming bronchial constriction caused by the action of these bases acting on the vagus. Five minim doses in these cases produce a high rise of blood pressure and irregular action of the heart. For this reason adrenaline is not suitable for these individuals and we have to look for something which will act on the vagal mechanism. The disadvantage of atropine and allied substances is that although they depress the terminations of the vagi, they have little effect in relieving the turgescence of the mucosa. In fact on account of their tendency to decrease the secretions, they make the sputum more viscid and difficult to expectorate. That is the reason why they are often combined with drugs like potassium iodide which render the sputum more fluid and which usually form a part of asthma mixtures.

Following up the broncho-dilator and marked expectorant action produced by *Saussurea lappa* in animal experiments, during the last few years we have given an extensive trial to the alcoholic extract prepared from the root in the treatment of bronchial asthma with very satisfactory results. This drug not only has a depressant effect on the vagal tone, but the essential oil during its excretion through the bronchi serves two important purposes. Firstly it produces relaxation of the involuntary muscle fibres of the bronchioles, and secondly it relieves the congestion of the bronchial mucosa by its well marked expectorant properties and its liquifying action on the tenacious sputum which occurs during the paroxysms and tends further to block the already narrowed air passages. The phlegm thus becomes loosened, is easily expectorated, the respiratory passages are cleared, and the attack is relieved. There is yet another action which comes into play and that is the reflex inhibition of the respiratory centre produced by the drug. We have already pointed out that the essential oil present in the root has a very strong, penetrating, and persistent odour and taste, and when the extract is taken by the mouth it relieves the bronchial spasm reflexly through the nerves of the upper portions of the respiratory and the digestive tracts. Besides this the drug has been shown to have a depressant action on the central nervous system, particularly on the algæic areas of the brain, which further helps in relieving the spasm. These factors undoubtedly account for the rapid effect produced by the

drug in cutting short the paroxysms and stopping further attacks when the extract is being administered. The strong smell and taste of the drug though advantageous in one way have disadvantages also. There are some patients, though fortunately a very small minority, who cannot take the drug on this account and if it is forced on them they vomit it. I have heard some of these patients say that they would much rather have the asthma than the drug.

The extract is administered either by itself in a little water or in form of a mixture such as the following:—

℞			
Potassium iodide or potassium			
bromide ..	..	gr. v to x.	
Tincture of belladonna ..	..	m. iii to v.	
Borax ..	...	gr. ii.	
Extract S. lappa liq. ..	..	drs. $\frac{1}{2}$ to 2	
Spr. chloroform ..	..	m. x.	
Aquam ..	..	oz. i.	

Though it is better to give the extract by itself when the drug is being administered to cut short a paroxysm, we prefer to prescribe the mixture when the administration has to be continued for some time to prevent further recurrence of the attacks, while the causal factors are being investigated and remedied. The drug has no cumulative action, so that it can be continued for long periods without harm, and it does not cause tolerance so that the dose has not to be increased. It is, however, desirable to give the mixture for ten days or a fortnight and then stop it to see if the attacks recur. In many cases where the paroxysms are merely produced by irritation through some temporary and not a deep seated cause, the extract combined with general treatment cures the patient for months or years and the attacks do not recur till these factors operate again. The patient is generally advised to take the mixture 3 or 4 times a day and keep a dose by his side when he goes to bed at night. This should be taken immediately when the premonitions of an attack are felt; the paroxysm is usually aborted and the patient can go to sleep again. The disturbance of sleep produced is comparatively much less than if an injection of adrenaline has to be taken or a powder has to be ignited and fumes inhaled. In fact the marked depressant action on the central nervous system which it possesses makes the patient quickly fall into a deep and sound sleep.

The series of cases tabulated includes many interesting cases. It includes a number of patients who were so bad that they could not sleep without an injection of adrenaline every night. Administration of the extract in 2 to 4 drachm doses stopped the recurrence of paroxysms. Another patient, a European Railway Officer, could not lie on his back at

night as the paroxysm would start as soon as he was in the recumbent posture; he had in consequence to sleep in a deck chair for three months. Regular use of the extract combined with exclusion of articles of dietary to which he was sensitive completely relieved him and he has now been free for nearly three years. Another case in this series was an Anglo-Indian employed in the Telegraph Workshops who had a history of previous attacks and who started very severe paroxysms when he was transferred to a branch where he had to work among acid fumes. Even on transfer back from this section the attacks continued for months, and when he came to the outpatient department he informed me that he had not slept for three weeks. The extract gave him immediate relief and with due care regarding protection from irritating fumes, etc., he has been quite free from attacks. He keeps the extract as a standby and takes it when he has a feeling of constriction in the chest or some other premonition of the attack after working in an unsatisfactory atmosphere. Many other similar cases may be cited from our series. Case No. 34 is of interest because she was one of those patients who could not take the extract of *kuth* root on account of the nausea it is liable to produce. She came into the hospital with a severe attack and injections of adrenaline, morphine and atropine ephedrine and asthma mixture by the mouth, inhalations of amyl nitrite and other remedies were tried without success. The attack lasted for four days and was eventually got under control by subcutaneous injection of gr. $\frac{1}{100}$ to $\frac{1}{50}$ of trinitrin. The drug failed in those cases where the causal factor was very potent, such as patients with a very high degree of eosinophilia, an indication that strong toxic bases were being absorbed into the circulation from some focus, or with such factors as a lesion in the nose, enlarged glands in the chest, or pathological changes in the gastrointestinal tract. Even in these patients there was some relief, though it was of a temporary nature.

Summary and Conclusions.

Saussurea lappa (*Kuth* root) has a remarkable effect in controlling the paroxysms of bronchial asthma. It cuts short the attacks and appears to have a marked and lasting effect, not only on the neuro-muscular apparatus of the bronchioles, but at the same time it relieves the turgescence of the bronchial mucosa by its well marked expectorant action. The tenacious sputum becomes liquified, is loosened and is easily expectorated, thus clearing the respiratory passages and preventing recurrence of attacks. It should be clearly understood, however, that although the paroxysms can be controlled in most cases the drug does not produce a permanent cure unless the causal factors are carefully investigated and removed.

The antispasmodic effect of this drug is mainly due to the powerful essential oil contained in the root which acts (1) reflexly, and (2) relaxes the bronchial musculature during its excretion. The drug further has a depressing action on the central nervous system, particularly on the algæic areas, and a stimulant action on the heart.

I am greatly indebted to Drs. J. C. Gupta, N. K. Basu and K. Venkatachalam Pillay for the trouble they have taken in helping me to analyse the cases given in the table.

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AN OUTBREAK OF THE EPIDEMIC DROPSY TYPE OF BERIBERI IN ALLAHABAD, 1927.

By R. N. BANERJI, M.B., B.S.,
Allahabad.

THE epidemic started about the middle of January, 1927; it reached its height in February and March and gradually passed away by the end of April, 1927.

Nearly 200 cases occurred scattered all over the town. Out of a total of about 500 Bengalee families about 100 families were affected.

The cases were restricted almost wholly to the Bengalee population. There were only 6 cases among the non-Bengalees, one in a Bengalee Muhammadan, one in a hill-man employed under a Bengalee clerk and sharing food with his master; and four among the Indian Christians. There were no cases among the Europeans or the U. P. Muhammadans. The diets of the Bengalee Muhammadans and native Christians, as also their habits were like those of the Bengalee Hindus.

The age incidence was between 4 and 60 years.

The incidence among females was much greater than among males (nearly thrice).

Breast-fed babies escaped entirely.

There were many cases among the Hindu widows who did not take fish or meat, but otherwise their diet was the same as that of the rest of the population.

Symptoms.—Nearly all the cases started with gastro-intestinal irritation, diarrhoea, anorexia, etc.

The pyrexia was of varying duration—with a remittent or intermittent type of temperature; the range of temperature was 99 to 101 or 102°F.

The œdema was confined chiefly to the legs and feet. In some cases it involved the arms, face, and hands. The œdema was more marked in the evening, decreasing after the night's rest.

There was no true neuritis, no pain, no sensory disturbances.

There were no rash or skin eruptions, but the skin over the legs turned purple towards the evening.

Serious cardiac involvement was not frequent; there was dyspnoea in many cases and cardiac dilatation with murmurs in only a few cases.

There was anæmia and general running down in health.

There were no hæmorrhagic signs.

There was impaired vision in one case.

The urine was free from albumen, casts, etc. no growth was obtained on culture.

Blood-examination showed slight polymorphonuclear increase and eosinophilia.

The average duration was about six weeks.

There were a few fatal cases—all among the females.

A change of station apparently gave benefit in all cases.

The minimum incubation period was 18 days.

Diets of the Bengalees.—Rice; fish and vegetables cooked in mustard oil; fresh fruits, etc.

The Gujrati and Kashmiri neighbours who had entirely escaped also used rice twice daily, but never used mustard oil in cooking and they did not use fish.

Source of the Rice.—Khalifa-ki-mandi is the principal grain mart in Allahabad. Here rice, as also other cereals, are sold wholesale and retail. There are several other marts in other quarters of the town. It is from these that most of the affected people purchased their rice. The main mart is a very insanitary market-place, being very damp and waterlogged during the rains. The sheds are also leaky in these godowns. The place is quite dry during the winter months. Kamala Bhandar, another rice mart from which many of the affected people purchased their rice, however, is a dry and pucca godown. In Khalifa-ki-mandi rice is imported from Bengal, Burma, and the United Provinces. Information was received that previous to the outbreak rice was not imported into Allahabad from Calcutta in any large quantity in any of the *mandis* or grain-shops.

Source of the Mustard Oil.—Most of the people (Bengalees) used bazaar made mustard oil, several samples of which when examined were found to be impure—adulterated with the oil from other grains resembling mustard seeds. Only a few people used pure oil and they entirely escaped (see later).

Distribution of the Cases.—Cases occurred in every quarter of the town, wherever the Bengalees resided.

The people affected belonged mostly to middle-class families living in pucca, dry, well-ventilated houses; and certainly none were very poor.

The biggest number of cases was in Lukergunj, a rather healthy locality so far as other common epidemics are concerned. In Lukergunj amongst a mixed population cases occurred only among the Bengalees.

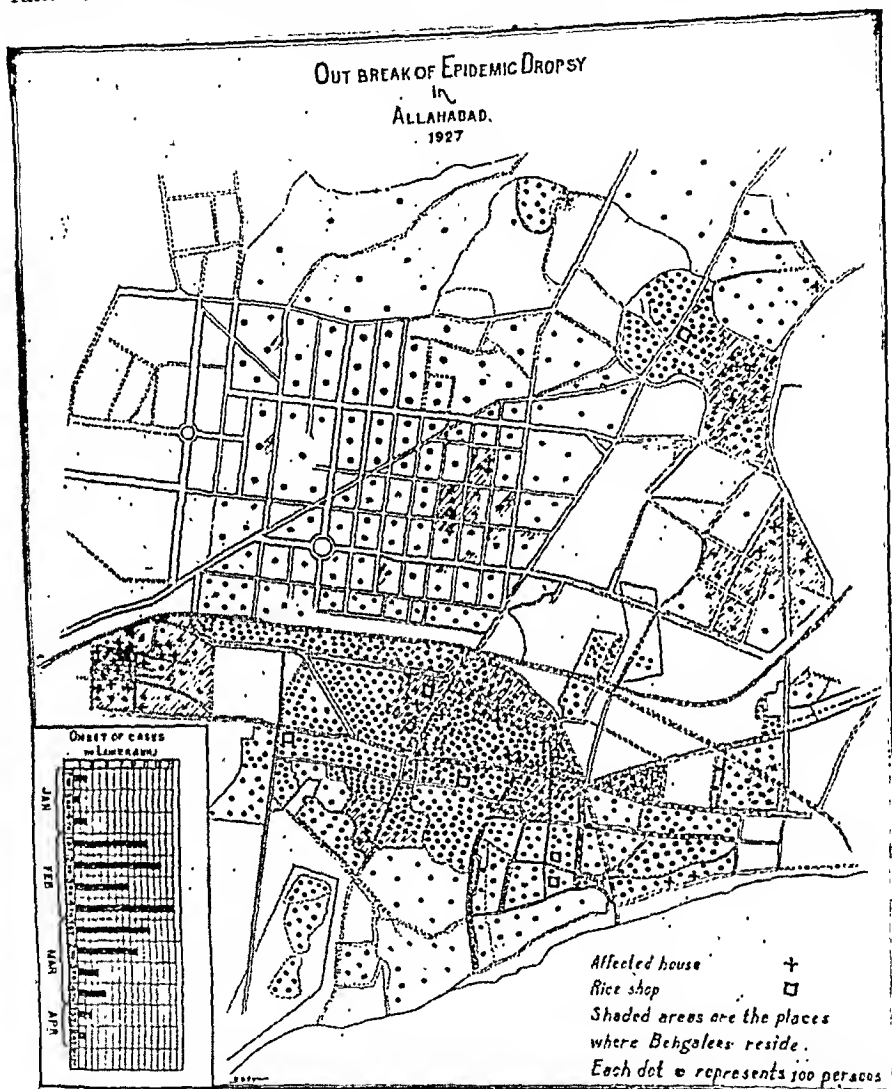
Infectivity of the Disease not Established.—The disease was not transmitted from person to person. During October and November, 1926, half a dozen imported families suffering from epidemic dropsy came from Calcutta for a change and were housed in different places in Allahabad. The people with whom they housed, as also their neighbours, entirely escaped, with the exception of one family. The incidence among the Bengalee families which received these

Of course, where both rice and oil have been stopped there has been improvement and no further new cases.

Can Rice be the Cause? Several members in a family were affected one after another, even when rice had been prohibited.

Cases occurred in three families who had stopped rice for nearly a month previous to their getting the disease.

A rice merchant of Calcutta with his family



patients from Calcutta suffering from the disease was thus less than among the rest of the Bengalee families.

Possible Causes.—Very likely bazaar made mustard oil (adulterated) is responsible, but may not be the only cause.

In one family fish and mustard oil were stopped as soon as a case broke out and there has not been another case during the epidemic.

The inmates of the jail prepare pure mustard oil for their own use and escaped.

Several families used pure mustard oil imported from some out-station and remained free from the disease.

In five families stoppage of mustard oil, while rice was being used all the time, led to recovery.

affected with epidemic dropsy came to Allahabad for a change. He brought some rice with him. He was strongly advised to discontinue the rice; the family then used locally purchased rice and were cured in six weeks.

Eleven families purchased more than a month's supply of rice from Kamala Bhandar about two months previous to the epidemic at about the same time and from the same set of bags. Of these seven were Bengalee Hindus, out of whom five families got the disease. The other four families were U. P. Muhammadans who entirely escaped.

CONCLUSION.

With our present knowledge it is difficult to say what are the exact causative factor or factors

of epidemic dropsy and whether it is a separate disease altogether from beriberi. As to what extent the nature of diet (food metabolism including excess of carbohydrate intake for generations), endocrines, and climate play their part is a problem that must await further solution. But one thing is certain and that is that epidemic dropsy or beriberi is not avitaminosis; much less does it correspond with anything resembling experimental avian polyneuritis. At present in food metabolism I would concentrate on carbohydrate metabolism in particular, for I have a suspicion that those races who are accustomed to take excess of carbohydrates for generations like the Bengalees are more susceptible to the disease. The Muhammadans here take very little carbohydrates and not a single up-country Muhammadan got the disease. The fact that the Bengalees were almost exclusively affected in the epidemic here is a very significant one, especially when all classes and races of people were living side by side under the same conditions. I cannot entertain the infection theory (from man to man) in this epidemic here for obvious reasons. It looks like a "rice-intoxication," but the epidemic may be a "toxi-infection."

I wish to record my thanks to Dr. R. N. Darbari, M.B., B.S., for going over the Lukergunj chari, and to Dr. M. N. Mitra, L.M.S., D.T.M., D.P.H., the Medical Officer of Health, for tracing out cases of epidemic dropsy in many of the consumers of common rice from certain rice-stores.

SODII SALICYLAS AND RHEUMATIC AFFECTIONS.*

By P. V. KARAMCHANDANI,

CAPTAIN, I.M.S.,

Officer Commanding, Indian Military Hospital, Pishin.

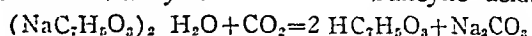
THAT sodium salicylate has stood the test of time and experience in acute rheumatic conditions is universally admitted. But its success in other, i.e., chronic rheumatic affections, has so far not been satisfactorily established. I have lately been making a special study of this kind of cases, and I am of opinion that sodium salicylate is equally efficacious provided it is administered by injection.

It may be noted that in acute rheumatic conditions, a toxin or toxins circulate in the blood and are therefore easily accessible to oral treatment. But in chronic cases the microbes are probably protected either by inflammatory overgrowth of connective tissue or by an excessive amount of carbon dioxide at the site of the lesion. In either

case, the drug administered by the mouth cannot reach the seat of affection in the full dose administered or without undergoing a change, so that the results obtained by this means have been varying and not sufficiently satisfactory to inspire confidence in the efficacy of the drug for such cases. To obviate these difficulties in the cases referred to above, the drug was administered by means of injection, and the results were found to be highly gratifying.

The action of sodium salicylate at the seat of affection may be represented by the following formula:—

Sodium Salicylate Salicylic acid.



Sodium salicylate coming in contact with nascent CO_2 (of which there is excessive production at the seat of lesion, for many of the patients treated described their affected parts as full of wind and almost bursting, and I have no doubt that the so-called wind is nothing more than the excessive CO_2 or combination of it) forms into salicylic acid, which exhibits its specific action.

I append a table giving a summary of the cases mentioned above of rheumatic affections other than acute treated by me with injections of sodium salicylate and give below short notes on some of them that appear to me of special interest.

Case 1. The patient suffered from a virulent infection. He had fever $102-104^\circ\text{F}$. and all except the shoulder joints were swollen. He was admitted into hospital for two months early in 1924, and was then treated with colloidal sulphur and iodine injections, sodium salicylate gr. xx t.i.d. combined with Atophan. His temperature did not come to normal until he was sent to a hot climate. The disease flared up again in the winter of 1926, when he was treated by me with sodium salicylate injections. He was relieved by the very first injection but four more were given.

Case 2. This was an obstinate and most stubborn case, resisting all forms of medical and electrical treatment. The patient always had dull pain with exacerbations of acute suffering in winter.

Case 9. In this case there was no fever, but the patient had excruciating pain which crippled him.

Case 16. This case presented a picture of glaucoma at first sight. As a matter of fact the case was so diagnosed by an eye specialist who advised the lady an operation. She was getting attacks of acute pain every night, starting in the eye and radiating to the cranium. They used to last three hours. She improved with the first injection and did not get any attack for seven days; on the eighth day she felt a dull pain in her left eye, but that too disappeared in fifteen minutes. She came for the second injection on the tenth day instead of the fourth day as advised, and had four more injections, but did not come for the sixth, although advised. When she left she had no pain.

Case 17. This case is of interest because sodium salicylate by the mouth always gave the patient

* Published by kind permission of the Director of Medical Services, India. The word "rheumatic" is used throughout this article to signify the conditions in which the essential pathological changes are confined to the fibrous tissue, and for want of an authentic name are variously described as rheumatics, chronic rheumatism, muscular rheumatism, tendinous rheumatism, rheumatic myositis, myalgia, etc., but have a definite existence.

TABLE.

No.	Name.	Nature.	Severity.	Number of injections and date of last injection.	Results.
1	Jem. Premsingh ..	Rheumatic arthritis ..	Very severe	Five, Nov. 1926 ..	No relapse.
2	K. S. N. A. Khan ..	Sciatica ..	" "	Six, July 1927 ..	"
3	Harilal ..	Lumbago and Sciatica ..	Severe ..	Five, July 1927 ..	"
4	Abdulhaq ..	Rheumatic arthritis ..	"	Two, June 1927 ..	"
5	Sep. Md. Sher ..	Sciatica ..	Mild ..	Two, June 1927 ..	"
6	Sep. Noorkhan ..	" ..	"	Four, June 1927 ..	"
7	Susa Mohd. ..	Lumbago ..	Severe ..	Two, June 1927 ..	"
8	Sep. Mardana ..	Pleurodynia ..	"	Two, July 1927 ..	"
9	Jetha ..	Sciatica ..	"	One, July 1927 ..	"
10	Pathan ..	Rheumatic arthritis ..	Very severe	Six, July 1927 ..	"
11	Sep. Muazkhan ..	Pleurodynia ..	Severe ..	Two, Aug. 1927 ..	"
12	Sep. Md. Afzal ..	Sciatica ..	"	Three, Aug. 1927 ..	"
13	Sep. Adalatkhan ..	Bursitis ..	"	Three, Sept. 1927 ..	"
14	Sukhran ..	Rheumatic arthritis ..	"	Three, Sept. 1927 ..	"
15	Sep. Syaidmohd. ..	Bursitis ..	"	Five, Sept. 1927 ..	"
16	Mrs. K. ..	Ophthalmic neuralgia ..	Very severe	Five, Oct. 1927 ..	Relieved.
17	Mrs. P. ..	Rheumatic arthritis ..	Mild ..	One, Oct. 1927 ..	Relapsed. 1-12-27.
18	Mrs. B. ..	" ..	"	Two, Oct. 1927 ..	Much better.
19	Sep. Kaliyandas ..	Myalgia ..	Severe ..	Four, Nov. 1927 ..	No relapse.
20	Jem. Sundarsing ..	Rheumatic arthritis ..	"	Six, Nov. 1927 ..	"
21	Sep. Namumoti ..	Torticollis ..	"	One, Dec. 1927 ..	"
22	Vanamamalai ..	Lumbago ..	Mild ..	Two, Dec. 1927 ..	"
23	Swp. Lalu ..	" ..	Severe ..	Six, Dec. 1927 ..	"
24	Gangaram ..	Rheumatic arthritis ..	Very severe	Nine, Dec. 1927 ..	"
25	Santaram Chauhan ..	Supra-orbital neuralgia ..	" "	Six, Jan. 1928 ..	Relieved.

NOTE.—Mild: Cases handicapped but not incapacitated.

Severe: Cases incapacitated but not confined to bed.

Very severe: Cases confined to bed during the attack.

immediate relief, but only so long as the drug was taken.

In all cases relief was almost instantaneous; patients who could hardly move through excruciating pain in the back and legs walked out within five minutes of the injection without any support and with no pain. Nor has any of them except Case 17 had a relapse up to the present day.

The technique adopted was as follows:—

For intravenous use gr. 5 of chemically pure sodii salicylas was dissolved in 5.5 c.c. of normal saline, reduced to 5 c.c. by boiling, and given slowly into the vein. For intramuscular use 2 c.c. of normal saline containing 5 grains of sodii salicylas was injected into upper outer quadrant of the gluteal muscles. Intravenous injections caused no untoward effect at all, either immediate or late, but the intramuscular injections did and it was a severe local pain subsiding gradually in ten minutes. I think it is advisable to fore-warn the patients about this. A course of six injections, preferably intravenously, (two in a week) is recommended. This may, if necessary, be supplemented by sodium salicylate orally.

As a result of my observations on the cases referred to above, I have arrived at the following conclusions:—

(i) Rheumatic affections other than acute yield with equally satisfactory results to sodii salicylas if administered by injections, as by this method it exhibits double action, viz., (a) neutralizing CO_2 , thereby relieving pain immediately, and (b) through the salicylic acid formed thereby, displaying an antiseptic effect on the microbes; and

(ii) The nature of the infection in acute and chronic conditions of rheumatism is probably the same.

A NOTE ON THE INTRAVENOUS USE OF UROTROPINE IN INFLUENZA AND NEPHRITIS.

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UROTROPINE, or hexa-methylene-tetramine, is a white crystalline powder and a condensation product obtained by the action of ammonia gas on formic aldehyde. It possesses an alkaline reaction in solution. For many years it has been used in medical practice, chiefly as a urinary antiseptic, though its value in this latter connection is very much open to doubt. In contact with the blood stream, it is supposed that the drug liberates formalin, and that its antiseptic action is due to this. The drug has also been tried in several other conditions, such as lithiasis, rheumatism, gout, cholecystitis, appendicitis, cerebro-spinal fever, encephalitis, meningitis, cystitis, etc.

In the influenza pandemic of 1918 I commenced to use urotropine intravenously in the hope that it would exercise some antiseptic influence on the septicæmic condition which is the cause of so much mortality in epidemic influenza. The results were so good that I have since adopted its intravenous use for treatment of all cases of influenza seen. As a rule, a single injection is sufficient to bring about a marked improvement in the patient's condition, and two or three injections bring about recovery. Even in cases where broncho-pneumonic

patches are present, results are good. In fulminant cases of influenza, this or any other remedy is of little avail.

The dosage given has been 15 grains dissolved in 4 c.c. of cold, sterile—preferably twice boiled—distilled water, given intravenously. The solution must not be boiled, as this causes decomposition of the drug. Ordinarily the sterile distilled water should be boiled again in a test tube; the required dose added under aseptic precautions, and dissolved in the cold water. The solution should be freshly prepared for each injection.

The injection should be given intravenously, and by this channel I have seen no complications. It is unsuitable for intramuscular or subcutaneous injection, as these are apt to be followed by local necrosis. In a few cases a marked reaction with fever and rigor is observed, but these subside almost at once.

The following six cases, out of a total of some fifty patients treated, will illustrate the method of use.

Case 1.—Hindu female, aged 25 years. History of influenza of some seven days standing, with fever of continued type, and much prostrated. Broncho-pneumonic patches in the lungs. An injection was given of 15 grains in 4 c.c., and was followed by a rigor with fever and profuse perspiration. The temperature dropped to subnormal that evening. A second similar injection was given the next day, and there was no reaction to this. There was no further fever and the patient made a rapid recovery.

Case 2.—Mahomedan male, aged 22 years. Seen on the second day of influenza. A single injection of 15 grains in solution was given and he made a rapid recovery. There was no reaction following the injection.

Case 3.—Hindu male, aged 35 years. Had been treated in hospital for influenza for some days, but the lung symptoms persisted, and the temperature remained elevated. Was given two such intravenous injections of urotropine, after which the temperature fell to subnormal, without reaction, and the patient made a rapid recovery.

Case 4.—Elderly Hindu male, about 50 years of age. Seen on the eighth day of illness when he was suffering from frank broncho-pneumonia, with extreme prostration. After a single injection, which was followed by no reaction, the temperature dropped to normal and the condition cleared up.

Case 5.—Mahomedan male, aged 25 years. Seen on the third day of illness. An injection of 15 grains was followed by a reaction with rigor and shivering. His condition immediately improved.

Case 6.—Hindu male, aged about 35 years. Influenza, complicated by lobar pneumonia, of 9 days standing. He received four injections of urotropine, after which the temperature fell to normal, and he made a sound recovery.

NEPHRITIS.

Encouraged by the result of using urotropine intravenously in cases of influenza, I commenced to use this drug intravenously in cases of both acute and chronic nephritis. Its effect in promoting diuresis and in eliminating dropsy appeared to be most encouraging. The quantity of urine passed increased, and in early cases albumin disappeared from the urine. In chronic cases improvement was definite, but no condition of cure resulted. The following are case records of such cases.

Case 1.—Elderly Hindu male, aged about 50 years. Duration of illness about 18 months, with much albumin in the urine, and marked œdema of the whole body. Was given three injections, each of 15 grains of urotropine intravenously on three consecutive days, followed by four twice-weekly injections. The œdema cleared up completely, and the patient appeared to be making most favourable progress. At this stage I was transferred to another station, but heard later that the œdema had recurred to a slight extent, but that the patient was much more comfortable than before.

Case 2.—Mahomedan girl, aged about 17 years, suffering from severe nephritis during pregnancy. After delivery the œdema persisted, with marked dyspnoea, and very scanty urine loaded with albumin. Severe constipation was also present. She received three twice-weekly injections, each of 15 grains; there was no reaction, the condition cleared up completely, and a permanent cure appeared to result.

Case 3.—Mahomedan male, aged 20 years, with nephritis of about 6 months duration. Marked œdema present all over the body; severe dyspnoea present, and the stools contained much mucus. A mitral bruit was audible, and the patient could not walk even a few yards. The urine was scanty and contained much albumin. In brief, prognosis appeared to be very bad. This patient received in all eight injections, each of 15 grains of urotropine, and appeared to completely regain his normal health. There was no reaction following the injections, and he has since been under observation for two years, and is now apparently in good health.

Case 4.—Hindu female, aged about 40 years. This was a case in a "rotten" state of health, with dropsy, dyspnoea, and profound anemia. The urine contained a large quantity of albumin. Eight injections, each of 15 grains of urotropine, were given, without reaction, and she appeared to make a sound recovery.

In connection with the above cases, it should be mentioned that full treatment with digitalis, purgatives, iron, and salines was administered simultaneously. Also a salt-free diet was prescribed.

It has been pointed out by some writers that urotropine irritates the renal epithelium and may cause hæmaturia after prolonged oral administration; but in the intravenous use of the drug I have never seen such symptoms to follow. In addition to influenza and nephritis, I tried the injections in a few cases of diabetes mellitus, since the drug is said to have an effect on the glycogenic action of the liver, but the results were not satisfactory.

CHLOROFORM ADMINISTRATION AND ITS DANGERS: AND THE ROLE OF THE EPIGLOTTIS IN ANAESTHETIC COLLAPSE.*

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(A paper read at a meeting of the Surma Valley Division of the Assam Branch of the British Medical Association on 1st December, 1923.)

THE first portion of the title of this paper will be familiar enough to any of you who may have followed with interest the recent discussion

* We have received this paper, which was read as long ago as 1923, with special reference to the note on p. 587 of our issue for last October with regard to the safety of chloroform administration.—EDITOR, *Indian Medical Gazette*.

in the *British Medical Journal* on the subject of æther and chloroform. The second portion you will find to be a novelty.

When I promised your Secretary many months ago to read a paper on this subject, I was not aware that a controversy on the relative merits and demerits of æther and chloroform was about to take place. The publicity given to the question by this controversy and the publication by a writer in the *British Medical Journal* of 25th August, 1923, of a case in which a patient who had collapsed under chloroform had been restored by hooking up the epiglottis, decided me to make known the fact which I had first discovered some fifteen years before.

It may seem strange to you that one should have allowed so long an interval to elapse without making public a rather useful discovery, but one swallow does not make a summer, and cases of severe collapse under chloroform luckily do not occur every day, so it required many years before I could feel absolutely convinced that the great cause of death during chloroform administration was due to impaction of the epiglottis in the upper aperture of the larynx. Again, too, the fact that it was so difficult to convince even spectators who had witnessed a patient restored by hooking up the epiglottis, showed me that it would not be easy to gain belief.

In addition the *cacæthes scribendi* has not been one of my afflictions.

It is now some fifteen years ago since alarming collapse occurred in a patient on whom I was operating, and finding that breathing was not resumed, and that the ordinary methods of restoration in the hands of the anaesthetist including rhythmical tongue traction had failed, I took a hand, and hooking my finger far back at the base of the tongue felt the epiglottis apparently blocking the airway. On pulling the back of the tongue upwards and forwards, bringing with it the epiglottis, respiration commenced immediately. It was well nigh impossible to resist the suggestion of cause and effect.

A consideration of the minor difficulties of chloroform and æther administration had made me a firm believer in the finding of the Hyderabad Commission, and my object was to clear the airway. I had previously speculated on the possibility of Laborde's method of rhythmical tongue traction being efficacious because it pulled up the epiglottis.

In this case some degree of cyanosis preceded the collapse. The next case was of the type which would be described as immediate heart failure. I was about to commence a modified Whitehead's operation for piles, and was on the point of making the preliminary incisions, sitting in front of the perinæum, when the whole peri-anal region literally flashed white before my eyes, followed by a startled exclamation from the anaesthetist. I found the patient with widely dilated pupils and apparently dead. The mouth was forced widely open with a gag, the tongue pulled forward with a forceps, and on hooking

my finger and pulling the back of the tongue well forward no improvement occurred. Forcing my finger still further downwards I found the epiglottis impacted within the superior aperture of the larynx, and with difficulty managed to get my nail under its posterior edge and lift it up. After a slight pause respiration commenced. When the breathing became tranquil the anaesthetic was resumed, and the operation completed without any further difficulty.

This case naturally increased my belief in the efficacy of this method of restoration.

In another case in which similar collapse occurred I found the epiglottis impacted in the same manner, and on lifting it upward and forward (in relation to the patient) respiration again became normal. After a short time I removed my finger and respiration again stopped. A second lifting of the epiglottis restored it, and keeping it lifted for a little time the breathing became normal, and the operation was resumed.

And at long intervals other cases occurred and linger in the memory, some dozen in all. In one case in 1913, an old family friend, the collapse was immediate and resembled cardiac syncope. She, too, when apparently dead, was restored by hooking up the epiglottis as already described. In this case the sudden onset of pallor without preliminary cyanosis, and immediate cessation of the heart and respiration, with widely dilated pupil, suggested actual death. In such cases it may be necessary to carry out artificial respiration, with the epiglottis held up, to restore the patient.

Some cases occurred during the Great War, but of these I can only remember that they occurred and were restored by what I had now come to look upon as the routine method.

Two cases occurred in the winter of 1920-21. In one of these cases the appearance of death was absolute, with death-like pallor and widely dilated pupil. The heart, as tested by a stethoscope, had stopped for well over a minute. In this case, too, hooking up the epiglottis, which was impacted in the upper aperture of the larynx, followed by artificial respiration with the epiglottis held up, restored the patient.

This man at a subsequent operation also developed alarming symptoms, and was restored in a similar manner.

About the same time an infant developed grave collapse under chloroform, and appeared to be dead, but was restored in a similar manner.

In another case, a long way back in the sequence, the familiar collapse occurred, and, on attempting to hook up the epiglottis, I found it impacted as already described. I was, however, unable to get my finger under the posterior edge to lift it up, and the patient appeared to be dead. The airway had to be restored, and, with an effort, I was just able to press the epiglottis to one side, making no further attempt to lift it. This allowed air to enter and breathing recommenced. After a short interval I was able to

hook up the epiglottis, and the case gave no further trouble during the subsequent anæsthesia.

The most recent case occurred in Cachar when performing a thigh amputation for tiger maul. This patient, too, ceased to breathe and appeared to be dead, but was restored by hooking up the epiglottis.

Of other cases I have not so clear a memory, and any reference to them lies in old case books not at present in my possession, but there were some dozen in all of the severe type.

This may seem to you a large number, but it is spread over some fifteen years, and includes the surgical work of the war period which was very heavy. In some cases, too, the anæsthetists were young and lacking in much experience of chloroform administration. There is no doubt that in the hands of a skilled administrator the number of dangerous cases is considerably lessened, but they still occur.

It is entirely owing to having used this method of restoration for many years, that I attribute the fact that I have never known death occur under chloroform in any case on which I have operated, during a fairly large surgical experience.

Let us now consider the probable mechanism of this undoubted incarceration of the epiglottis in the upper aperture of the larynx.

I say undoubted, because I have felt it, but I have found it hard to convince others, and will doubtless find it difficult to convince you that such is the case. The ingrained reverence for authority is strong in most of us, and the teaching of to-day in the schools is that the heart fails first and not the respiration. The Hyderabad Commission, with a large experience of chloroform, held the reverse.

The first factor that emerges is that collapse under chloroform nearly always occurs in the initial stages of administration. At this stage the patient's reflexes, speaking generally, are much diminished but still present, and swallowing movements may occur, and always do if vomiting is threatened. At the same time the larynx is still capable of responding to the irritation of a heavy concentration of chloroform vapour by a certain amount of spasm. Given these factors a forcible attempt at inspiration, when the larynx is brought nearer to the epiglottis, may result in the latter being sucked down into the upper aperture of the larynx and there acting as a hinged valve.

This approximation of epiglottis and larynx may take place when, during muscular relaxation, the back of the tongue sags downwards or when a swallowing movement lifts up the epiglottis, approximating it a little closer to the back of the tongue.

Any further attempt at inspiration only leads to the epiglottis being more firmly imprisoned. The intrusion of the epiglottis into the sensitive upper aperture of the larynx leads to spasm.

When this spasm relaxes it is probably only

in the muscular relaxation which accompanies practical death.

In the case of a robust heart the interval between failure of the respiration and the subsequent failure of the heart may be long enough to allow of some warning cyanosis to be visible. In the case of a weak heart the interval between the two may be so short that pallor, with little or no preliminary cyanosis, occurs and the case appears to be one of primary heart failure. The action of the chloroform already circulating in the blood, doubtless, too, acts in a toxic manner on the cardiac muscle, but, in the great majority of cases, would not by itself alone be capable of causing a fatal result.

From the anatomical features of the epiglottis and its physiological rôle of preventing food or drink from entering the larynx, the passive sagging back of the posterior portion of the tongue during anæsthesia should have a similar effect to the active action of the back of the tongue in swallowing. Both would render it easier for the epiglottis to occlude the larynx.

It may be objected that, the epiglottis being attached to the tongue, traction on the tongue with forceps should lift out the epiglottis and restore the respiration. The practical fact remains that it does not always do so, and that I have felt the epiglottis incarcerated whilst considerable traction was being exercised on the forepart of the tongue.

In this connection I have found it possible to swallow water with my tongue held well forward by a handkerchief, without any going the wrong way. The traction was not, of course, as strong as in a case under anæsthesia, but the little experiment is suggestive.

It is possible that anatomical peculiarities, elongated glosso-epiglottidean folds, and a lymphoid tendency, may render the epiglottis more liable to become incarcerated.

Should these considerations be correct, as I believe them to be, they furnish an explanation of many procedures which experience has shown to be good practice during the induction of chloroform anæsthesia.

A gradually and regularly increasing strength of chloroform vapour is less likely to lead to coughing, and laryngeal spasm, and, at the same time, prevents the occurrence of retching, and reactionary vomiting.

Reactionary vomiting should be prevented from occurring whenever possible. Its threatened onset is indicated by up and down movements of the larynx, and frequently by a submental pallor extending over the anterior triangles of the neck.

These symptoms should be met by an increase in the strength of inhaled vapour. It is the young and nervous anæsthetist who is most likely to become alarmed by these signs, and allow the patient to almost "come to," which is usually followed by vomiting. In this connection it is probable that pulling forward the tongue and lifting the angles of the jaws, all tend to lift

the epiglottis away from the danger zone, but if these were efficacious in all cases no catastrophes would occur.

It is also evident that preliminary forcible chest pressure before beginning artificial respiration must tend to force out the epiglottis and clear the airway in some cases. All these measures are of proved value.

Equable administration I look upon as the most important factor in lessening the liability to grave symptoms during induction.

Personally I am not in favour of too much dilution with air during chloroform induction. This view is, I know, liable to challenge but, in a hot country at least, I have never seen any ill effects follow from keeping the mask quite close to the face. Sufficient air enters by the side of the mask. During very hot weather I have often used a folded towel laid gently over the mask, but not closely approximated to it over the nose. This tends to limit the escape of chloroform vapour into the outer air and hastens the onset of surgical anaesthesia.

Frequently one meets with patients who, after a small quantity of chloroform has been inhaled, fall into a condition of torpor which is not surgical anaesthesia, and who cannot be induced to breathe deeply by smacking or pinching. In some such cases only the first touch of the knife will induce them to make the full inspirations which end quickly in anaesthesia.

In these cases, previously breathing with extreme shallowness, the concentration of chloroform vapour should be lessened the moment deep inspirations begin, or a dangerous degree of chloroform in the blood may occur.

The deep regular breathing, with just a suggestion of stertor in it, is the best guide to the condition of the patient. Once this has begun dangerous symptoms only occur with the greatest rarity.

The paramount condition of keeping the airway clear is obtained in the case of "mucousy" patients (rare in chloroform administration) by frequently swabbing out the back of the throat with swabs clipped by holders or forceps.

I am rather in favour of fairly quick induction of anaesthesia. I have never seen any ill results follow if carefully conducted.

As regards the other great danger, delayed chloroform poisoning, it seems to me a moot question whether fatty hepatic degeneration is more likely to be induced by a weak blood concentration for a long period, or a somewhat stronger one for a short period.

And now as to the measures to be adopted should a grave case of collapse occur in spite of every care.

- (1) The gag to be placed in left side of mouth, which is to be forced widely open. In many cases it and the tongue forceps will be already in position, and this is the safest of all, but undesirable on other grounds. If not already applied mouth wedge

and gag should be absolutely ready, and if the gag is of the screw kind the screw should be opened sufficiently to allow the inter-dental plates to be in apposition, as moments may be precious.

- (2) The tongue forceps in the anaesthetist's left hand pulls out the tongue as far as possible.
- (3) The anaesthetist stands facing the patient's head on the right side.
- (4) Place the index or first two fingers, palmar surface to convex surface of the back of the tongue, and pull it upwards and forwards. In minor cases this will release the epiglottis.

In more severe cases, should the above procedure fail, the tip of the nail of the index finger must be insinuated under the free edge of the epiglottis. I have found this a matter of some little difficulty in two or three cases. The finger should then be slid along the lower surface, and the epiglottis lifted up and pressed by the pulp of the index finger against the back of the tongue.

Breathing will generally start immediately, as the finger in this position is probably a powerful stimulant of the respiratory centre. If it does not do so artificial respiration should be begun at once with the epiglottis held up.

Long, slender, so-called "artistic" fingers are a great asset in this manoeuvre.

In one extremely difficult case, so depressed was the epiglottis and so difficult to reach, that I could not get a finger tip under its edge. In such a case it would be necessary to press the epiglottis to one side and further downwards to allow air to enter round the edge, as was successful in this case, already narrated.

It is likely that traction on a sharp hook applied in the middle line at the back of the tongue would effect the release of the epiglottis, but of this I have no experience, having always found the finger sufficient. In the case of a mouth difficult to open widely, or an anaesthetist with short "stubby" fingers this manoeuvre should be tried.

In the worst and most desperate cases it may be necessary to carry out artificial respiration, with the epiglottis hooked up, for a short time. Forcible chest compression, which empties the chest of a good deal of vapour, should be a preliminary to any attempt. It should be remembered that, even if the respiration has failed first, the heart is in a desperate state too, and ventilation of the lungs is a step in lessening the toxicity of the blood and enabling it to resume its function.

Should the above procedure be carried out, chloroform administration, I believe, will quickly lose its terror, a terror so great that in the United Kingdom it is practically banned as an anaesthetic, and a new generation is growing up that knows not chloroform, although no other

anæsthetic has yet been found that possesses its advantages for emergency use.

I shall be more than pleased if I have contributed anything to the knowledge of its safer use.

I do not hope to convince many of you (the effects of early teaching are very strong), but if I can only succeed in getting you to consider a little the point of view I have endeavoured to put forth, and then in the hour of your patient's desperate need try the measures which I have explained to you, I shall be more than content.

For I believe that in that way safety lies.

A PRELIMINARY NOTE ON THE USE OF EPHEDRINE IN LEPROSY.

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and

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It was found while using adrenalin in the febrile and asthenic condition which is not uncommon among the leprosy patients at Gobra Leper Hospital, that in a large proportion of cases nerve pains were remarkably relieved. As a result all cases of nerve pain were treated with adrenalin, 3 to 5 minims of 1 in 1,000 adrenalin chloride solution (P. D. & Co.) in 30 minims of saline being injected intramuscularly. With a few exceptions in which there was no effect, this remedy was found to relieve the pains within a very short time.

The relief caused by adrenalin suggested that ephedrine, which has an action similar in many respects to that of adrenalin, might have the same effect. This was found to be the case, and indeed ephedrine was found to be more efficient and lasting in its action, having besides the additional advantage that it can be taken orally, whereas adrenalin in order to produce any result has to be injected.

The nerve pains in leprosy are due to the presence of the *Mycobacterium lepræ* in the nerve trunks, especially those of the limbs, the ulnars and peroneals being the most affected. *M. lepræ* causes by its invasion of the nerve trunks a granulomatous condition of the connective tissue (epineurium, endoneurium and perineurium) surrounding the axis-cylinders. Considerable cellular proliferation may take place gradually during the quiescent phase (Muir, 1928) of the disease, but when reaction takes place and lepra cells are broken up either naturally or as the result of treatment, there is sudden vascular engorgement of the granulation tissue and the pressure on the axis-cylinders is suddenly increased, the nerve often becoming very much swollen within a comparatively short time. Were it not for these nerve reactions leprosy would be a comparatively painless disease; and a drug which while relieving this condition acts

at the same time as a tonic and improves the general condition of the patient is a very great boon to sufferers from this painful condition. Ephedrine sulphate given in hard gelatine capsules in a single dose of 0.05 to 0.1 gramme is sufficient in most cases to cause relief in from 45 to 60 minutes. The action lasts for 12 to 24 hours or even longer.

In many patients nerve reactions are caused in the course of treatment with iodides, each dose of potassium iodide causing pain which lasts for 24 to 72 hours or even longer. If ephedrine is taken by the patient whenever he feels the beginning of the pain, he is able to continue treatment in comfort until the granulomatous condition is cleared up and the iodide fails to cause further reactions. Often a single dose is sufficient, freedom from pain remaining till the reaction has passed off.

The immediate action of ephedrine is probably due to its causing contraction of the arterioles of the nerve trunks and thereby relieving their vascular engorgement. It appears at the same time to raise the reaction level of the patient and make reactions less severe; it does not appear however to interfere with the beneficial effects of iodide in gradually clearing up the disease in the nerves and other parts of the body.

The action of ephedrine is in contrast to that of opium and its preparations which only relieve pains to a slight extent and that only for a short time, while they have a harmful effect on the general condition of the patient.

While the action of ephedrine is very marked in the majority of cases, there are some patients who are not relieved. The reason for this has still to be investigated, as has also the effect of this drug on the blood pressure of the patient. A feeling of vertigo is caused in some cases and it is well to begin with the smaller dose mentioned above in the first instance, so as to test the patient's tolerance, a second dose being given after 45 minutes if there is no marked vertigo and if the nerve pains are not relieved by the first dose. If pain returns on the following day a smaller dose may suffice to produce the required effect.

The following cases illustrate the effects of ephedrine in thirteen cases in which it has been tested, the most of whom were under treatment with potassium iodide:—

Case 1.—I. M. There was pain in the right ulnar nerve after treatment. On giving ephedrine sulphate 0.1 gramme pain disappeared entirely within one hour. The next day pain returned slightly, but after giving 0.05 gramme the pain was relieved and did not return.

Case 2.—A. S. Severe pains in forearms, knees and legs after potassium iodide grains 10. Ephedrine sulphate 0.1 gramme caused pain to disappear within an hour.

Case 3.—S. K. R. Severe headache for 4 days following potassium iodide grains 140, which had been given frequently before without causing any headache. Ephedrine sulphate 0.1 gramme relieved headache within an hour.

Case 4.—M. M. Severe pain in ulnar nerve after potassium iodide 45 grains. After 0.05 of ephedrine sulphate there was no cessation of pain, but it was

entirely relieved after a second similar dose. Pains returned again the next day but were relieved by 0.05 gramme dose. There was a return at night but the same dose removed the pain which did not return, and patient slept well.

Case 5.—K. After potassium iodide grains 90 there was pain in the knee joints and the anterior margin of the tibiae. There was no relief after 0.1 gramme or again after a second dose of 0.05 gramme.

Case 6.—G. After potassium iodide (35 grains) there was aching of the whole body. Ephedrine sulphate 0.05 gramme relieved the pain within one hour but patient stated that he felt as if he was under a narcotic.

Case 7.—O. Pain in left ulnar nerve and knee joint after potassium iodide grains 240 and an injection of 7 c.c. of hydnocarpus oil. Ephedrine sulphate relieved pain, and the patient felt giddy.

Case 8.—J. B. Pain in the left ulnar nerve after potassium iodide grains 120 and hydnocarpus oil 6 c.c. Ephedrine sulphate 0.1 gramme relieved pain within 45 minutes.

Case 9.—J. S. Pain in right ulnar nerve after potassium iodide grains 12, was relieved by ephedrine sulphate 0.05 gramme.

Case 10.—D. S. Pain in ulnar nerve. Ephedrine sulphate 0.05 gramme gave no relief; 0.1 gramme, given half an hour later, relieved the pain but the body felt hot and there was a feeling of nausea. The next day when pain returned it was relieved by 0.1 gramme without these symptoms.

Case 11.—M. There was pain in the legs after potassium iodide grains 60. Ephedrine sulphate 0.05 gramme gave relief lasting for one hour. Thereafter as the pain returned a second similar dose was given and pain was relieved for the whole night, but the patient had a feeling of heat throughout the body. On the 2nd and 3rd days when pain returned it was relieved by 0.1 gramme and 0.05 gramme, respectively.

Case 12.—T. K. S. During a severe reaction there was pain in the ulnar nerves. Ephedrine sulphate 0.05 gramme gave relief for one hour, but due to a feeling of giddiness a further dose was not given. On the next day 0.05 gramme gave no relief.

Case 13.—A. E. D. During general leprous reaction 0.05 gramme was followed by vomiting. A second similar dose caused relief for 15 minutes after which there was sweating and palpitation. Two days later 0.05 gramme was followed by palpitation but there was no relief.

INDIAN KALA-AZAR IN A NEWLY-BORN CHILD.

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and

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In connection with any kala-azar investigations one of the questions that is repeatedly arising is, What is the incubation period in kala-azar? No satisfactory answer to this question has been forthcoming. Manson (1919) reports one case in which the incubation period appears to have been 10 days or less, and another case is reported by Napier and Muir (1923) in which the incubation period was not more than 14 days. On the other hand Napier (1927) reports a case in which the first symptoms appeared 18 months after the patient had left an endemic area, and from time to time cases crop up in Northern Europe and America in persons who have not been in known endemic areas for many years.

Recently, Shortt (1927) reported a case in which the incubation period was either 2 to 4 weeks, or 9 to 10 months, most probably the latter period. It thus seems probable either that the incubation period is not by any means constant, or that in certain instances the first clinical manifestations are so slight that they are not recognised by the patients themselves.

Another point in connection with kala-azar in India that recently came under discussion is the comparatively rarity of the disease amongst infants. At the recent F. E. A. T. M. Congress Lt.-Colonel W. C. Ross, I.M.S., made the statement that the disease did not occur amongst breast-fed infants and was exceedingly rare in children under the age of 2 years. Whilst it is



perfectly obvious that the age grouping in India is nothing like that of the Mediterranean type of the disease where, to quote a recent series of cases, 97 per cent. of the patients are below the age of six and 14 per cent. less than one year old, yet it is wrong to suppose that the disease does not occur amongst very young children. The Indian mother does not readily bring a very young infant to a dispensary for treatment, and when she does the doctor is faced with a distinct problem; blood for the serum tests is not easily obtained as it is not easy to introduce a needle into a vein in so small a child, either for the purpose of making a diagnosis or for administering treatment. It is therefore probable that the disease is much more common amongst infants than the official returns show.

During the last few years we have diagnosed and treated quite a large number of patients below the age of one year at the Calcutta School

of Tropical Medicine, but the case quoted below was infected at an earlier age than any other case which we have seen. This patient showed the first symptoms of the disease before it was four months old; it is interesting to note that in Paradiso's (1926) Catania (Sicily) series of 1,346 cases only three cases are below this age.

The case which is reported below is, thus, of interest in both these connections.

A Hindu male infant, said to be 6 months old but subsequently shown to be in its 8th month of life, was brought into the field dispensary at Kaorapukur on November 15th. The history given was that the child had been born in April 1927, had remained comparatively well for three months, but from July had suffered from continuous fever. Its temperature at the time was about 100°F., the pulse was rapid, the spleen could be felt about three inches below the costal margin and the liver was palpable. The blood was taken and the aldehyde test was found to be definitely positive. A diagnosis of kala-azar was made and in the ordinary course of events the treatment would have been commenced, but as the case was one of special interest it was brought to the notice of the senior writer who performed a spleen puncture in order to confirm the diagnosis. Numerous *Leishmania* were found in the smear and treatment was commenced; the child made satisfactory progress.

The child's parents were poor but healthy ryots. They had one other child aged three years; this was also quite healthy. The child had lived throughout in the village of Cheari in the 24-Parganas District of Bengal, a kala-azar endemic area. It had been breast-fed since birth.

As the mother showed no sign of the disease at all it is extremely unlikely that the child was suffering from the disease at birth. The history of the case, the size of the spleen and the condition of the blood, as shown by the aldehyde test, are all in keeping and suggest that the infection had lasted at least four months when the child was first brought for treatment.

Three points that are brought out by this case are:

- (i) that the Indian type of the disease does occur in newly-born breast-fed infants,
- (ii) that the incubation period in this case was almost certainly less than three months, and
- (iii) that infection was transmitted during April, the latter half, May, June or July.

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A Mirror of Hospital Practice.

SUPRA-PUBIC CYSTOTOMY IN A CASE OF ENLARGED PROSTATE.

By BASHIRUDDIN AHMED,

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AN aged Brahmin, about 75 years of age, was brought to this hospital on the night of the 15th October, 1927, for treatment for retention of urine, due to an enlarged prostate. Retention had been complete for 72 hours, and an attempt made at Brahmanbaria hospital to pass a catheter had been unsuccessful. There was no history of previous retention.

On the morning of the 16th the patient was anaesthetised with chloroform and the bladder relieved by catheter. As there was constipation a dose of magnesium sulphate and an enema were given. In the evening the bladder had to be relieved by catheter, again under chloroform anaesthesia.

On the morning of the 17th an attempt was made to pass a catheter without chloroform, but was not successful. As the patient was old and debilitated and would not stand a daily dose of chloroform, supra-pubic cystotomy was decided upon and carried out by Dr. Rai J. N. Mitra Bahadur, Civil Surgeon, Tippera. The middle lobe of the prostate was found to be much enlarged. The patient's condition at the time of operation did not justify prostatectomy, so a drainage tube was put in and the bladder drained.

From this date until the 27th the patient did well, without any serious symptoms. On the 28th he passed red coloured urine, so the bladder was washed out daily for three days with boracic lotion until the urine again became normal.

The drainage tube was removed on the 7th December, and an indiarubber catheter was inserted through the supra-pubic wound and tied into position with his waist band, and a clip put on the end of it. With this arrangement the patient could get about, and relieve his bladder at stated intervals by releasing the clip. The catheter was removed from the supra-pubic wound a week later, and a rubber catheter inserted by the urethra, and left there for two days.

This was finally removed, as the patient could now pass urine spontaneously without difficulty by the urethra. The supra-pubic wound healed well, and the patient was discharged cured from hospital on the 25th December, 1927.

The interesting feature of the case is that the senile prostate diminished in size after operation to an extent sufficient to permit the patient to pass urine voluntarily, without compelling him to lead a subsequent "catheter life," whilst at the same time the operation of prostatectomy—which would have been a risky one in so aged and debilitated a patient—was avoided.

My thanks are due to Rai J. N. Mitra Bahadur for his kind permission to publish the notes on this case.

A CASE OF FOREIGN BODY IN THE VAGINAL MUCOUS MEMBRANE.

By R. K. RAJAGOPALAN,

Sub-Assistant Surgeon, Shivalkoppe.

A FEMALE infant, 9 months old, was brought to this dispensary with a history that a paddy grain had become embedded in her vagina. It seems that the parents used to allow the child to play on the ground in the fields, and the baby gradually crawled on her chest to a heap of paddy grain close by. Owing to her lively kicking movements, a grain of paddy had accidentally entered the vagina and had become firmly embedded in the mucous membrane. The baby's mother was horrified and did her best to get it out, but without success. Other relatives also failed, and the child was brought to the dispensary three days later.

There was a slight collection of purulent matter in the posterior fornix. Being unable to get even my little finger into the vagina, an ear speculum was inserted, and the vaginal canal explored. The paddy grain was now seen, but an incision had to be made into the perineum to get at and remove it. The slight wound was then sutured. The parents never brought the child back to the dispensary for re-examination.

A CASE OF INCISED WOUND OF THE LUNG.

By A. S. DAWSON, L.M.P.

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THE following case appears to me to have important medico-legal bearings, since, had one not known the exact history of what happened, the case might easily have been mistaken for one of attempted homicide.

Mg Po Myin, aged 25 years, a male Burman of Letpangone village, was brought to the Thonze hospital on the 22nd May, 1927, with the history of having sustained the following injury. He was descending a bamboo ladder attached to the house where he was living, when he suddenly slipped and fell a distance of some 12 or 13 feet. At the time when he was descending the ladder he had in his hand a long sharp knife, or dao, his hand resting on his left shoulder: as he fell this slipped off and struck him on the back over the apical region of the left lung and penetrated the pleura and the lung.

The knife was extracted by his relatives, the wound dressed with a filthy cloth, and the patient brought to hospital. On admission a wound was found, 3 inches in length, gaping, and with frothy blood escaping at each inspiration from it. A considerable quantity of blood had already been lost.

The wound was cleaned and sutured under an anæsthetic and dressings applied. Unfortunately

it then suppurated and traumatic pneumonia developed, followed by pyopneumothorax. The pus was eventually evacuated, and with good drainage the patient made an uneventful recovery. He has subsequently been seen and is in good health.

Had the patient died from the injury, it seems likely that questions as to possible homicide might have been raised, since it would be extremely difficult for a person to stab himself in the apical area of the left lung at the back with a long knife.

MYIASIS IN A LEPER.

By G. R. RAO,

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CASES of myiasis have been reported in medical journals from time to time, but the following case deserves notice on account of its peculiarity.

Joga Behara a B₃—A₂ case of leprosy in this asylum, suddenly developed an alarming œdema of the whole face on the morning of the 5th December, 1927. The œdema was specially marked around the orbits. The previous night he was all right except for a little bleeding from his nostrils. He had no other signs or symptoms worthy of note. His nose was examined, and as he had a foul discharge, a nasal douche with warm carbolic lotion 1 per cent, was ordered. Half an hour after the douche a dead dipterous larva came out of his nose on sneezing; and he brought it to me. As I was then busy with other work, I could not spend much time in identifying the larva. But from the observation made for a short time, I came to the conclusion that it was a dipterous-cyclorhapha larva as it had an undifferentiated head. The patient was instructed to preserve the larva with any other that might come out of his nose. But unfortunately by some misunderstanding he threw the specimen away, along with several others that came out of his nose during the course of the day.

Larvæ of the following families are said to commonly infect the wounds and natural orifices of the human body in this country:—

(1) Cestidæ. (2) Sarcophagidæ. (3) Muscidæ.

In this asylum Sarcophagid flies and Lucilia flies—(blue and green bottle flies) are very commonly found. Possibly the larvæ might have been either Sarcophagid or Lucilia.

Stitt in his book on *Practical Bacteriology, Blood work and Parasitology* says that Lucilia flies are very fond of the foul odour of an ozonous discharge from the nose. Possibly in this case the foul discharge from the nose might have attracted a Lucilia.

The patient was treated with the same douche of warm carbolic lotion thrice a day and he made an uneventful recovery in four days. Repeated attempts to recover some living larvæ by gentle scraping failed.

Whenever cases of sudden swelling of the face with no fever or no albumin in the urine and no other symptoms of note occur, especially in lepers, the possibility of myiasis should be considered.

ON SOME CLINICAL FEATURES OF MALIGNANT TERTIAN MALARIA.

By KALI GATI BANERJEE, M.B.,

Noapara, Ganutia P. O., Birbhum.

DURING the months of September, October and November, 1927, malaria of malignant tertian type has claimed its victims by hundreds in this district of Birbhum, and I was called in to see many of these cases as a village practitioner,—some of them on their death beds, others less critically ill. Unfortunately facilities for microscope work are not available here, and my observations have had to be of the clinical type, aided by therapeutic results. Before giving details of certain cases, it may be as well to give a short summary of the types of cases observed and of the lines of treatment adopted.

Age.—Persons of all ages were subject to attack, but children of 2 to 6 years of age appeared to be the most susceptible, and to succumb most readily.

Types of Fever.—The types of fever seen may be classified as follows:—

- (1) Convulsive type.
- (2) Diarrhœic type.
- (3) Miscellaneous; viz. (a) hyperpyrexial type, (b) urticarial type, and (c) typhoid type.

Convulsive type.—These patients were mostly male children of from 2 to 6 years of age. The majority of them proved fatal despite the most vigorous measures. Most of these cases showed a remission on the second day, but had severe fever on the third day with convulsions, which sometimes persisted till the fourth day. The number and frequency of the convulsions seemed to bear no relationship to the prognosis. Another peculiar feature of these cases was that all of them had intractable tympanites.

Choleraic and Diarrhœic type.—The majority of these cases were adults, all seen being males. Bilious vomiting and diarrhœa, often with blood and mucus in the stools, were prominent features in almost all cases. In a few, however, vomiting was absent, but the intensely toxæmic state of the patient and the diarrhœa or dysenteric condition present might have led one to diagnose the case as one of severe bacillary dysentery. Diagnostic features of these cases however were that (1) the intestinal symptoms made their appearance concurrently with the paroxysm of fever. (2) the intestinal symptoms disappeared during the remissions of fever. (3)

Murphy's sign was present in all cases; and, finally, (4) a most important diagnostic point was that there was tenderness of the spleen in these cases. In addition (5) pain was present in the umbilical region, and (6) acetone and albumin were present in the urine.

Miscellaneous types. (a) *Hyperpyrexial type.*—These cases ran a short course of from three to five days and were less fatal than might have been expected.

(b) *Urticarial type.*—Only one such case was seen, but it tended to confirm Sinton's statement that the malarial paroxysm is of the nature of an anaphylactic reaction. The patient was a boy aged 12 years, who complained that he had fever every alternate day, accompanied by painful itching all over the body and the appearance of local swellings which came out within a few hours of remission of the fever. After an interval free from symptoms he had a similar attack in the last week of September; after this relief for some days, without treatment; then five relapses of fever, followed by a sixth, when he came to see me. I found the swellings to be of typical urticarial type. Quinine therapy completely cured the malaria, and also the condition of urticaria; since then the boy has been on systematic administration of quinine, and has remained free from all symptoms.

(c) *Typhoid type.*—These patients show a remittent type of temperature chart for from three to four weeks. The temperature is usually highest in the evenings, and with this rise of fever there is a tendency to diarrhœa. Typhoid-like stupor, however, is absent, but the presence of a slow pulse rate with intestinal symptoms may mislead one to diagnose the case as one of enteric fever. Quinine therapy, however, cured the condition and clinched the diagnosis.

Treatment.—The treatment adopted wherever possible was Sinton's method of the administration of alkalis, followed by quinine orally. Calcium salts were also administered in the more severe cases in the hope of controlling the convulsions and with a view to combating anaphylaxis. In the convulsive cases potassium bromide proved useless. In such cases resort was had to intramuscular injections of quinine, saline infusions, and adrenalin, but with little effect. In very severe cases drinks of glucose-brandysodium bicarbonate solution were given orally in the hopes of combating acidosis, together with the alkali and quinine treatment.

The following are notes on some of the more interesting cases seen.

Case 1.—Male, 1 year old. His elder brother, aged 10 died in the same house a week previously, on the 3rd day of fever with convulsions. When seen had had fever for 2 days with convulsions. Was treated by an alkaline mixture orally containing potassium citrate, sodium bicarbonate, and digitalis; followed by quinine in acid solution. Also adrenalin solution, 4 minims by the mouth 4-hourly and otherwise when necessary.

Made a complete recovery after having taken 36 grains of quinine orally in 36 hours.

Case 2.—Male, aged 5 years. Previous history of malaria off and on, with (?) epilepsy. Present attack commenced with chill and ague, a remission on the 2nd day, with convulsions and twitchings of the facial muscles on the 3rd day. Treatment similar to that in Case 1 was given, but the parents refused to allow quinine to be administered to the child whilst he was having high fever. Glycerine enemas were given, and magnesium sulphate added to the alkaline mixture, but the child died the next day in a state of convulsions.

Case 3.—Male, aged 6 years. Previous history of asthma and (?) epilepsy. Present attack set in with chill and rigor, and remission on the 2nd day. Convulsions set in at 9 a.m. on the 3rd day. When seen by me shortly afterwards, he was unconscious, with a temperature of 105° F., pulse rate 160, respirations 48, and stertorous. The spleen was not palpable, but tympanites was very marked. Turpentine stupes were given and $\frac{1}{2}$ c.c. of pituitrin intramuscularly, followed by 10 grains of quinine intramuscularly. Rectal saline and sodium bicarbonate were given per rectum; hydrotherapy resorted to; and an alkaline mixture with potassium bromide given when the patient was able to swallow. Death ensued however at 8 a.m. on the morning of the 4th day of illness.

Case 4.—Female, aged 6 years. Previous history of occasional fever. Present attack started with ague and chill, and remission on the 2nd day. Convulsions set in on the 3rd day. Quinine and alkalies were now prescribed, and after the administration of 24 grains of quinine in 12 hours the patient regained consciousness. The next morning, however, fever recurred with severe rigors, and she died.

Case 5.—Male, aged 37 years. Seen on the 3rd day of fever. A condition present of bilious vomiting and diarrhoea with blood and mucus in the stools. With the remission of the fever the intestinal symptoms abated. Murphy's sign was strongly positive; the liver enlarged and tender; the spleen enlarged, and jaundice present; temperature 102° F., pulse 120, respirations 32. This patient was given a strongly alkaline mixture, followed by quinine in acid solution. He took 160 grains of quinine in solution within 54 hours, and was completely cured.

Case 6.—Male child, aged 1 year. Remission of fever on the 2nd day, followed by convulsions on the 3rd day. The convulsions especially affected the left side of the body and appeared to begin from the lips, with groaning. Temperature 101° F., pulse 140, respirations 36. Given subcutaneous saline with adrenalin, 10 grains of quinine intramuscularly, and finally alkalies and quinine orally. The total dosage of quinine given was 8 grains orally within 6 hours, and the intramuscular dose of 10 grains, but the patient died on the 3rd day.

Case 7.—Female infant, aged 5 months. A similar history to that of Case 6, with convulsions on the 3rd day; temperature 105° F., pulse 168, respirations 38, and very marked tympanites. Hydrotherapy was given, 2 minims of adrenalin solution every 2 hours by the mouth, and an alkaline mixture containing sodium bromide, alternating with quinine and calcium lactate, taken in powder in honey. Drinks of glucose, brandy, and sodium bicarbonate in water were given by the mouth. This patient took 8 grains of quinine hydrobromide within 12 hours by the mouth and made a splendid recovery.

Case 8.—Male child, aged 4 years. Two convulsions with fever on the 2nd day of illness. On the 3rd day the temperature rose to 101° F., with unconsciousness, and convulsions, the pulse almost imperceptible at the wrist, very marked tympanites, and an enlarged and palpable spleen. He was at once put on to an alkaline mixture containing digitalis, followed by 5 grain doses of quinine in solution every 3 hours, the dosage of

quinine then being reduced to 3 grains for 3 doses, and then replaced by 3 grains of euquinine in powder with honey, calcium lactate being added to the powder. A drink containing brandy, glucose, and sodium bicarbonate was also given freely. The patient made a sound recovery after taking 50 grains of quinine within 42 hours.

Case 9.—Male child, aged 2 years. Had had fever for 4 days before being seen. No convulsions present, but when seen child was rolling his head from side to side, was unconscious, and the pulse could not be felt at the wrist; temperature 102° F. A subcutaneous injection of adrenalin was administered at once, but the child died before any further measures could be taken.

Case 10.—Male, aged 22 years. History of fever for 4 days, with remission on the 2nd day. On the 3rd day excessive vomiting set in with fever, and the passage of stools containing blood and mucus. The liver was enlarged and tender; Murphy's sign positive, the spleen enlarged and a certain amount of jaundice present; temperature, when seen on the evening of the 3rd day, normal, and pulse of low tension. Was given adrenalin in 10 minim doses orally, followed by an alkaline mixture and quinine in solution. In all he took 44 grains of quinine within 8 hours and made a complete recovery.

Case 11.—Male child, aged 12 years. Urticarial type of case as detailed above. Liver enlarged and tender; intense jaundice present, Murphy's sign strongly positive, anaemia marked, spleen very much enlarged. At first given an alkaline mixture to which sodium salicylate and urotropine were added, followed by 10 grains doses of quinine in solution, twice daily. Calcium lactate also given in powder form; and later the alkaline mixture, but with quinine pills administered. This patient took 40 grains of quinine in solution within 48 hours and escaped the expected next attack of ague and urticaria.

Case 12.—Female child, aged 5 years. Had a previous attack of malaria about 2 months before. Present attack began just before midnight with rigors, convulsions every 5 minutes, and unconsciousness. I saw her an hour before her death. The pulse was imperceptible, and the first cardiac sound scarcely audible. The respirations were 40 to the minute, stertorous, and with signs of œdema of the lungs; temperature 103° F. The knee jerk was markedly accentuated in the right leg, but normal in the left leg. Kernig's sign was absent, but there was definite rigidity of the neck muscles. The spleen was just palpable. A special feature of the case was the presence of marked internal strabismus. An immediate injection of $\frac{1}{2}$ c.c. of adrenalin solution was given, and 1 grain of quinine intramuscularly, but the patient died an hour after having first been seen.

Remarks.—My experiences in this outbreak of a very virulent type of subtertian malaria are probably akin to those of other medical men in India; yet certain points seem to impress themselves on me as the result. The main points which I should like to bring forward, are (1) that once the malignant tertian parasites have got hold of the cerebral circulation, so to speak, most usual measures are hopeless. I have not tried the effect of intravenous quinine in such cases, but the condition is one where all the usual emergency measures seem almost useless. (2) Quinine in big—even heroic—doses may safely be administered to these severe cases of malaria, even when their temperature is elevated. The medical practitioner who hesitates, is lost; push quinine in generous doses is the best working rule. (3) Sinton's method of treatment by

administration of an alkaline mixture, followed by quinine in solution, appears to me to be the most efficacious mode of administration of quinine. (4) There are certain adjuvants to this line of treatment which appear to be worthy of trial, in such severe and fulminating cases. The first of these is administration of calcium salts; the second, if acidosis is the condition underlying the critical state in malaria, the administration of glucose-brandy-sodium bicarbonate drink in large volumes by the mouth. According to the *Medical Annual*, 1927, article on diabetes, administration of 50 grammes of glucose by the mouth can cure the acidosis due to starvation within an hour.

I have not tried intravenous quinine for such cases. It is a line of treatment in village practice which makes one pause before venturing upon it. 'Better to bear those ills which we have than fly to others we know not of.' But of one fact I rest assured; that when the village medical practitioner is faced with epidemic and virulent subtertian malaria, such as was present in this district last autumn, quinine—in adequate doses—is his sheet anchor of treatment.

A NOTE ON THE TREATMENT OF CHOLERA.

By A. S. DAWSON, L.M.P.,

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THE treatment of cholera to-day is by no means standardised, and many modifications of Sir Leonard Rogers' hypertonic saline method have been introduced. After trying different methods I have now adopted a routine one which gives some 80 per cent. of cures. In a recent series of six cases, I only lost one—a boy of 8 years of age, not seen until 18 hours after the onset of the attack, and in a condition of severe collapse; in fact I doubt whether any line of treatment would have saved this patient.

My routine method is to first administer essential oils' mixture, whilst preparations are being made for the administration of saline subcutaneously. The sooner the case is seen, of course, the better the prognosis, for by more than six hours after the onset of the attack the patient may have been seriously depleted of fluid, and the renal and systemic circulations be endangered.

The following mixture is given in doses of one ounce every half hour till 8 to 10 doses have been given;

R Spirit. ætheris	..	..	m 30
Ol. caryophylli	..	..	m 5
Ol. cajuputi	..	..	m 5
Ol. juniperi	..	..	m 5
Acidi sulphurici dil.	..	..	m 15
Misce.			
Aquam ad.			oz. 1 per dose.

In the meantime one pint of hypertonic saline is slowly administered per rectum from an ordinary douche can, and 3 to 4 pints of hypertonic saline should be given into the cellular subcutaneous tissues. For the latter an ordinary douche can may be used, fitted with rubber tubing and a hollow needle. The temperature of the fluid should be at or below normal.

Body temperature, 99°F; the saline should be given at 100°F.

Body temperature below normal; the saline should be at 102°F.

Body temperature 101°F. or more; the saline should be at or below normal.

The temperature is easily tested by running the fluid over the bulb of a thermometer, and cold or hot sterile saline added to the fluid in the douche can till the required temperature is reached.

For children the doses, both of the oral mixture and of hypertonic saline, should be halved. If the saline per rectum is voided, it should be repeated until it is retained. It is especially in the case of children that the saline should be given into the cellular tissue, since it is difficult to introduce a fairly large bore needle into the vein in a child without transfixing the other side; further, many physicians are not expert in intravenous administration. At the same time cardiac stimulants are given as necessary; e.g. gr. 1/100th of digitalin or strophanthin hypodermically.

If suppression of the urine occurs apply dry cupping over the loins. If still no urine is passed, it is necessary to give alkalines intravenously, the following injection being given;

R Sodii chloridi	..	..	grs. 60
Sodii bicarbonatis	..	..	grs. 160
Aquam distill.	..	..	ad oz. 20

This to be followed up, if necessary, by hypertonic saline intravenously.

With regard to diet milk, soup, and alcohol should be eliminated, and barley water and thin arrowroot congee given. Old and debilitated patients may be given a 5 per cent. solution of glucose by the mouth.

A point to be remembered with regard to the essential oils' mixture is that it should always be given in the manner indicated above, and that its value is much less if the duration of the case is more than 6 to 8 hours. In such patients, when seen early, the essential oils' mixture alone may be sufficient, without any subcutaneous or rectal saline. The mixture has a distinctly stimulating, as well as bactericidal action.

Lastly, with regard to prophylaxis, for all contacts one dose of the essential oils' mixture should be given on one or two consecutive days, or until all risk of infection has ceased. The mixture may also be used for general administration to the households in the neighbourhood until the epidemic has died down.

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APRIL.

THE BURMA GOVERNMENT RESOLUTION ON INDIGENOUS MEDICINE.

WE publish elsewhere (in our "Current Topics" section) in this issue of the *Indian Medical Gazette* the full text of this resolution. The most important terms of reference of the Committee appointed are (a) "to examine and report on Burmese systems of medicine; and (b) to consider whether Burmese systems of medicine (*sic.*) can be improved, and if so, in what way."

The resolution suggests that there is an intention to establish courses of training in the Burmese systems of medicine at Government expense. If this action is taken, there will soon be at least three Indian indigenous systems of medicine in which training will be given under the auspices of Local Governments. It is a pity that Madras and the United Provinces should have taken such precipitate measures for establishing schools of training in the indigenous systems. The first logical step in any such matter is to arrive at a clear understanding of the systems concerned, and the next to consider whether it is desirable or not to restore those systems at Government expense. State-aided education in technical subjects is expected to concern itself with methods which are generally recognised as being the most efficient, and it is regarded as wasteful to encourage inefficient and antiquated procedures. As there is an insistent demand for the restoration of the indigenous systems, it is necessary first to find out exactly what these systems consist of, and to let the people understand clearly what good or harm is likely to result from expenditure from the public purse in connection with their restoration.

It would be interesting and useful to establish an enquiry into the principles and practice of the various indigenous systems; money spent on such an investigation would not be wasted. There are many scientists in India who are in no way associated with medicine who would be competent to conduct an enquiry of this kind; their findings would command respect, they would be impartial, and would have a great educational value.

The attitude of the American Government towards the indigenous systems of medicine in the Philippine Islands is worthy of serious consideration in this connection. Every one is allowed to practise medicine according to any "system" which he may select, but a license is given only on condition that the candidate has taken out an approved course of training in the preliminary scientific subjects, *viz.* chemistry, biology, anatomy, physiology, etc. In other words, it is held

to be essential that the medical man should have a sound educational foundation on which to build his professional knowledge, whether he intends to practise scientific medicine or one of the indigenous systems.

In India there is a tendency to think that any one is fit to be entrusted with the care of the health of the community, provided that he has a smattering of knowledge of drugs. In the present evolution of medical relief in India there will for many years be scope for the village doctor who has had no scientific training, but governments ought to act with a full sense of responsibility when they lend themselves to the training of young men in methods which are regarded by the rest of the world as inefficient and obsolete. If the students had a sound preliminary training and a good knowledge of the basic sciences, they could be trusted to pick out what is good in the indigenous system; but to encourage them to plunge straightway into a study of the indigenous systems without a preliminary education in scientific methods is to perpetuate the very evils which the governments concerned are trying to eradicate.

It is to be hoped that the Burma Committee on the indigenous systems will do their work thoroughly and will give us a reasoned statement of the advantages which can be derived from State aid to the old systems; in any case they ought to insist on the possession by every candidate of a good preliminary education in biology, chemistry, anatomy, and physiology; otherwise they will commit themselves to the attitude that the whole of the rest of the world is wrong in regarding disease as something that must not be handled except by men who have been educated on the best possible lines.

A dangerous suggestion, indeed, lies in the very use of the word "system." Every other branch of human knowledge has got away from the idea that there are various "systems" which are worthy of encouragement. There is only one system of chemistry, one system of anatomy, one system of biology. Everywhere there is a serious attempt to arrive at the truth, and the same principle ought to apply in medicine. What would the world think if a movement were to arise in India for the restoration of astrology, or of alchemy? Is it conceivable that the great army of medical scientists in every country of the world are working on wrong lines, and that therefore we must discard the vast body of knowledge which they have built up? There can be only one "system" of medicine, not the homeopathic, nor the allopathic, nor that indigenous to any country, but scientific medicine, and all our efforts ought to be directed towards the building up of a medical science which must necessarily be world-wide and international, it will necessarily be the most efficient for coping with disease. A common fallacy exists that the ancient systems are cheap: inefficient methods are never cheap and if any standard of attainment is selected, the scientific method of attaining to

that standard must be the cheapest. Let us concentrate first of all on something that can be accepted by everyone and institute an independent enquiry into the nature and methods of the systems for which special claims are made.

THE SEVENTH CONGRESS OF THE FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE.

THOSE who were present at the recent Congress of the "F.E.A.T.M." will agree that the *Indian Medical Gazette* was not guilty of exaggeration during the pre-Congress period when it laid stress upon the importance of the forthcoming meeting to be held in Calcutta.

By universal consent the Congress is now regarded as the most valuable symposium on tropical medicine which has ever been held.

Those who worked so hard in preparing for the Congress are to be heartily congratulated on the brilliant success which resulted from their efforts. The Government of India are to be congratulated on their generous support; a whole army of enthusiastic collaborators are to be congratulated; but everyone will agree that the chief share of the credit is to be attributed to Lieut.-Col. J. Cunningham, I.M.S., the General Organising Secretary, and to Lieut.-Col. A. D. Stewart, I.M.S., the Local Secretary for Calcutta. The Congress was fortunate in securing organisers whose ability and energy enabled them to overcome the thousand and one difficulties which were encountered.

It was feared that the Seventh Congress would compare rather unfavourably with the Sixth on the social side, but, thanks to the generous help of His Excellency the Governor and Lady Jackson and a host of other helpers, Calcutta well maintained its reputation for hospitality. From the scientific point of view also a very high standard had been set by Japan, but here also India rose to the occasion in a most spirited manner, and the only complaints which reached our ears were that the time was far too short for the splendid programme of papers and debates.

Calcutta is the gateway of India from the Far East; it is also the centre of India from the point of view of accessibility and capacity to absorb a large army of guests. The Congress found an ideal meeting place in the old Medical College of Bengal and the new Calcutta School of Tropical Medicine. Calcutta is the commercial, scientific, and medical capital of India, and so it was eminently suitable to be the meeting place for the Congress. Never in her history has India seen such a gathering of medical experts. We might have expected difficulties in connection with language, but almost all of our visitors spoke English with great facility, and so the Congress was practically unilingual. The obstinate refusal of the Anglo-Saxon peoples to cultivate foreign languages may ultimately turn out to be a blessing in disguise, as English is rapidly becoming the *lingua franca* of the Far East.

In Japan one of the sessions was held in Esperanto, but it was noteworthy that the members who attended failed to understand the chairman when he announced in Esperanto that the proceedings had terminated. However unfair it may be that English is singled out for preferential treatment, there is no doubt that the most practical solution of the language difficulty is for each country in the East to adopt English as its second language.

J. W. D. M.

A CHANGE OF EDITORSHIP.

WHILST we cannot refrain from congratulating Lieut.-Col. J. W. D. Megaw, V.H.S., C.I.E., I.M.S., on his recent promotion last February from the post of Director of the Calcutta School of Tropical Medicine to that of Inspector-General of Civil Hospitals, Punjab, yet we most sincerely deplore his loss to the Calcutta School of Tropical Medicine, and his relinquishing the post of editor of this journal. The *Indian Medical Gazette* has had many distinguished editors, but never one who was more suited to the editorship of this journal than Colonel Megaw, who has been its editor since 1921. The *Gazette* is a journal which is primarily intended for the general practitioner, whether in town or *mofussil*, and it was in catering for this public that Colonel Megaw showed his great breadth of outlook and his knowledge of the requirements of this class of reader. At the same time he always appreciated fully the importance of scientific papers, especially those with a direct clinical application. Whereas the progress made by this journal in India is undoubtedly due to the particular appeal which it has always made to the general practitioner—largely through its "Current Topics," "Mirror of Hospital Practice" and "Reviews" sections, for which Colonel Megaw was largely responsible—its more scientific sections are perhaps chiefly responsible for its more international reputation.

It has been in keeping the balance between these two aspects of this journal, and thereby satisfying both classes of readers, that Colonel Megaw has been so successful. The circulation of the *Gazette* is not the direct concern of its editorial staff, but we are informed that this has more than doubled since Colonel Megaw took over the editorship seven years ago.

Colonel Megaw has gone, but the good work which he has done still remains. We hope, by following the traditions which he has laid down, that the *Gazette* will not only hold the position in which he has left it, but that its rate of progress will be maintained in subsequent years.

We must congratulate Colonel Megaw on his promotion. We have lost him as our editor, but we sincerely hope that we will still retain his services as one of the most important contributors to this journal.

THE INDIAN MEDICAL YEAR, 1927.

WE regret very much that this year it has been necessary for us to depart from our usual practice of publishing our annual supplement, the *Indian Medical Year*, with the April number of the *Gazette*. This review is now ready, but various circumstances have made it necessary to postpone its publication until next month, May. Our annual index is to be published with the current (April) number; this will bring the number up to full weight for postage. No less than fifteen contributors have sent in summaries for inclusion in the annual review and we hope that it will be truly comprehensive.

SPECIAL ARTICLE.

OBSTETRICS AND GYNÆCOLOGY IN THE DAYS OF THE PATRIARCHS.

By V. B. GREEN-ARMYTAGE, M.D., F.R.C.P. (Lond.),
LIEUTENANT-COLONEL, I.M.S.,

(An address delivered to the Medical Section of the Asiatic Society of Bengal on the 14th June, 1926.)

Note.—This address was originally published in *The Journal of Obstetrics and Gynæcology of the British Empire*, Vol. XXXIV, No. 3, but we have received so many requests from our readers in India that it should be re-published in this country, that we publish it with the kind permission of Mr. Comyns Berkeley, Editor of that journal.—EDITOR, *Indian Medical Gazette*.

My particular reason for thinking that the subject on which I am about to address you might be of interest to you arose recently when I was delving in the Bible for anthropological evidence of endocrine influence, such as might bear upon the matter of the "hirsute man of action" and "the smooth man of thought," and whereas I might have mentioned Nimrod, Goliath, Samson, Judith, or Jezebel, each of them respectively illustrative of hyper-adrenalism, hyper-pituitarism, and hyper-thyroidism, I chose rather to quote the birth of Esau and Jacob which, from an Anglo-Saxon point of view, cannot fail to be of interest to those of us who dwell in the Delta of the Ganges.

In my search it occurred to me that it might be of more than ordinary interest to observe, from an expert point of view, the references in the Rabbinical writings to gynæcology and obstetrics, and to this end I have used the Moffat Translation, the Revised Version, and the Douay Authorised Translation.

I do not intend to stray far outside the path of my title, but, perhaps it may entertain those of you who follow work at the Tropical School of Medicine to study that wonderful description of bacillary dysentery in the Second Book of Chronicles, Ch. 21, v. 15 and 19, and then to pass on to the picture of the oncoming of the monsoon in the First Book of Kings, Ch. 18, v. 43-45.

STERILITY.

Throughout the Old and New Testaments there are multiple references bearing on the psychological importance of the possession of children, for children are regarded as Divine gifts, *vide*, Gen. Ch. 4, v. 1; and Ch. 33, v. 5; and Ps. 127, v. 3.

This is a natural conclusion in a developing country where more hands meant better crops, and especially in the case of weak tribes, in which man-power was much needed for continual wars.

It is not surprising, therefore, that barrenness is looked upon as a reproach, thus Sarah was despised by Hagar, her handmaid, in Gen. Ch. 16, v. 4, for Sarah was primarily sterile and only later conceived after a long period of amenorrhoea, *vide*, Gen. Ch. 18, v. 11.

Again, Rachael in Gen. Ch. 30, v. 1, through envy of Leah cried, "give me a child or else I die"; and in I Sam. Ch. 1, v. 6, we find Hannah's rival taunting her because the Lord "hath shut up her womb." In St. Luke Ch. 1, v. 25, it says that "Elizabeth rejoiced when the Lord took away her reproach among men"; and again in St. John, Ch. 16, v. 21, our Lord refers to "the joy of a woman at the birth of a man child into the world."

It is of considerable interest to find such classical examples of elderly primiparæ and note that presumably in those times these children were born without trouble to either mother or child; whereas to-day circumstances and experience so frequently indicate Cæsarean section for such cases. The elderly primiparæ mentioned are Sarah, (Gen. Ch. 21, v. 2,) who bore Isaac; Manoah's wife, (Judges 13, v. 24,) who bore Samson; Hannah, (I, Sam Ch. 1, v. 20), who bore Samuel; the Shulamite woman (II, Kings, Ch. 4, v. 17); and Elizabeth, (St. Luke Ch. 1, v. 36) who bore John, and in whom "quickening" at about the 20th week is first mentioned.

In connexion with sterility it may here not be out of place to enquire how it is that the Jews, despite all persecution, are now, as then, the most prolific people in the world. From a Biblical point of view there would appear to be two reasons, which, in those days were empirical, based on minute observations of the priests, but to-day are proven to have a scientific explanation.

The first reason is in the diet. This consisted of substances perfect in A, B, C, and E vitamins, for instance, read David's entertainment (II Sam. Ch. 17, v. 28) of "wheat, barley and meal, and parched corn, beans and lentils and olives, honey and butter and sheep and cheese of kine"; and that of Solomon in I Kings, Ch. 4, v. 22, which is much the same, included "fatted fowl and fatted oxen."

It is not necessary to refer to the countless enumeration of fruits and vegetables including cucumbers, melons, leeks, onions, and garlic, though as a sidelight it is perhaps interesting, in view of the modern sugar fermentation, that "a

lump of figs" was prescribed by Isaiah as "a plaster" for Hezekiah's boil, (II Kings Ch. 20, v. 7.).

From the above diet it would therefore seem that the work of Mellanby, McCarrison, Plimmer, and Marshall in Great Britain, and Dickinson in America, on the effects of food on reproduction and health were empirically anticipated by the patriarchs; and that the maxim "the vitamins are to the endocrines what the endocrines are to the economy," was instinctively realized by the Jewish people. One must, however, admit from the story of Rachael and Leah that superstition or medicinal properties apparently attached to mandrakes, (love-apples in Moffat), for in Gen. Ch. 30, v. 14, it is written "Reuben going out at the time of the wheat harvest found mandrakes which he brought to his mother Leah, and Rachael said, 'Give me part of thy son's mandrakes, and Jacob slept with Leah that night and she conceived'; and later also Rachael conceived,"—Mandrake is *Mandragora autumnalis* (Solanaceæ), and is an antispasmodic.

The second reason for the multiplication of the people of Israel is to be found in the Book of Leviticus, in which those rules for coitus are laid down which are of such extreme interest in view of the recent work of Wilfred Shaw, Novak, and others on ovulation; for it has been proved that ovulation does not occur until the 13th to the 17th day of the menstrual cycle, counting the cycle as beginning on the first day of the period. Now coitus is forbidden to orthodox Jews before eight days after the last day of the period, that is, coitus is not permitted until approximately the time of ovulation.

Moreover, with reference to the above rules as regards coitus, and menstruation, it is a remarkable fact that the orthodox Jewish woman is almost immune to cancer of the cervix uteri. Is this immunity the result of circumcision and therefore of greater cleanliness, or is it because their code permits no extraneous organisms to enter the vagina during the first eight days after the menstrual period—that is, during a time when the vagina is alkaline and its resistance to infection therefore least; for we now know that the acid protective flora of the vagina and cervix are not normally actively present until the seventh or eighth day following menstruation.

May one not therefore suggest that the ultra-microscopic organism of Gye and Barnard or the "individual potential virus" is neutralized in the orthodox Jewess by these rules for coitus laid down in the Mosaic Laws; for one would expect in a community in which large families are the rule rather than the exception, that cancer of the cervix uteri would be particularly common.

Moreover, in a people bound by such laws of cleanliness, it is not surprising to find that there are very strict prophylactic rules for prevention of infection in women; for instance, in Lev. Ch. 15, it is laid down that "the man that hath an issue of seed shall be unclean and then shall he

be judged subject to this evil when a filthy humour at every moment cleaveth to his flesh and gathereth there. If he who suffereth this disease be healed, he shall number seven days after his cleansing and having washed his clothes and all his body in living water he shall be clean." It is probable that this is the first mention of venereal infection in the Bible.

LABOUR.

Considering the family character of the Biblical narrative, it is perhaps surprising that there are not more accounts of abnormal parturition. A possible explanation of this fact may be that, with a healthy population and healthy diet, difficult labour did not occur very often. There are, however, references to traumatic miscarriage and abortion in Ex. Ch. 21, v. 22, and Num. Ch. 12, v. 12.

Labour was in the hands of midwives probably of the Sarah Gamp or *Sage femme* type, who did little beyond ironing the vagina and giving kindly advice; though it is obvious from the reference (Job. Ch. 26, v. 13) "his obstetric hand brought forth the winding serpent," that operative midwifery, probably version, was practised.

In Ex. Ch. 1, v. 15, it is written "and the King of Egypt spoke to the midwives of the Hebrews, commanding them that, when they attended the Hebrew women and saw them on the birth-stool they were to kill the child if a male and let it live if a girl"; and when they did not obey him they answered the King's enquiry by saying, "because the Hebrew women are not like the Egyptian women, they are brisk creatures and delivered before ever a midwife reaches them." The Revised Version translates this passage "the Hebrew women are skilful in the office of a midwife and are delivered before we come to them."—the "B.B.A." (born before arrival) of the modern student.

It is, however, pleasing to recognize that then, as now, a good midwife was treasured and flourished exceedingly, for one reads "God dealt well with the midwives and built them houses."

The meaning of the "birth-stool" is of interest, for it would seem that postural treatment of labour cases was regularly practised by the ancients. Indeed, the squatting position is that used to-day in the East for a hard labour, and there is no doubt of its efficacy as I have myself noted in right occipito-posterior cases. The purchase given to the patient by her arms round her knees in the squatting position promotes flexion, rotation, and descent of the head, and this presumably is the meaning of Gen. Ch. 30, v. 3, "go in unto her that she may bear upon my knees," and Job Ch. 3, v. 12, "why received upon the knees." For then, as now, among many primitive people the travelling mother was placed either squatting between the knees of the midwife, or in a kneeling position bending over her thighs.

The birth-stool, or Kreisstuhl, as the Germans call it, can be seen in France and Germany to-day, just as it can be seen in parts of India, Japan and China, and it certainly has mechanical if not æsthetic advantages.

In a work published in 1637 called "The Expert Midwife" by James Rueff, we have an exposition of the use of this stool, which is of historical interest. "Let the stool be made compasswise, under-propped with four feet, the stay of it behind bending backward, hollow in the midst, covered with a black cloth underneath, hanging down to the ground, by that means the labouring woman may be covered, and the other women sometimes apply their hands in any place, if necessity require. Let the stool be furnished and covered with many cloths and colours at the back and other parts, that the labouring woman receive no hurt of the infant anywhere, strongly kicking and striving because of the pains, stirrings and motions of the mother. After the labouring woman be placed in her chair about to be delivered, the midwife shall place one woman behind her back who may gently hold the labouring woman, taking her by both the arms, and if need be, the pains waxing grievous may stroke and press down the womb, and may somewhat drive and depress the infant downwards. But let her place other two by her sides which may both, with good words, encourage and comfort the labouring woman, and also be ready to help and put to their hand at any time. This being done, let the midwife herself sit stooping forward before the labouring woman and let her anoint her own hands and womb of the labouring woman with oil of lilies, of sweet almonds, and the grease of a hen mingled and tempered together. For to do this doth profit and help them very much which are gross and fat and them whose secret parts are strict and narrow, and likewise them who have the mouth of the matrix dry, and such women as are in labour with their first child." From this description we may picture the use of the birth-stool in the days of Moses.

The first record of a midwife attendance is in Gen. Ch. 38, v. 27, and is of great interest, for it represents classical treatment, and is the first published case of spontaneous evolution with live uniovular twins and ruptured amniotic sac, or sacs, which according to Whitridge Williams, is very rare, only 44 cases being on record. It is interesting to note that Viardel in the 17th century first observed this and stated that, when twins were of the same sex they were usually enclosed in a single amnion, whereas twins of different sexes were separated by a partition wall; he expressed the belief that Providence took this means of guarding their morals *in utero*!

The passage in the Bible referred to above, runs "Thamar appeared to have a big belly, and when she was ready to be brought to bed there appeared twins in her womb, and, in the very delivery of the infants, one put forth a hand

whereon the midwife tied a scarlet thread, saying, this shall come forth the first; but he, drawing back his hand, the other came forth, and the woman said why is the partition divided for three, and therefore called his name Phares, afterwards his brother came out on whose hand was the scarlet thread, and she called his name 'Zara.' This case is of additional interest for it might appear from another interpretation of the text that this is the first recorded case of complete rupture of the perineum, and as there is no further mention of Thamar it is probable she died of puerperal sepsis.

There is only one other reference to twin labour and it gives one food for thought. It is in Gen. Ch. 25, v. 21-26, "and Isaac besought the Lord for his wife because she was barren, and He heard him and made Rebecca to conceive, and the children struggled in her womb and she said, 'If it were to be so with me what need is there to conceive.'" The meaning of this is, that miscarriage or premature labour threatened, for obviously it was recognized that tumultuous movements of the fœtus with or without a "big belly" frequently anticipated premature labour or death of the fœtus. "And she went to consult the Lord and when her time was come to be delivered, behold twins were in her womb, he that came forth first was red and hairy like a garment and his name was called Esau, and immediately the other coming forth held his brother's foot in his hand and therefore he was called Jacob." One may therefore presume from this that the children were uniovular twins, somewhat premature, and not of great size seeing that Rebecca was a primipara and had been married some time.

I have often wondered if Esau was a freak of atavism, but in the light of modern endocrinology I am inclined to think that here we have the first traditional examples of hyper- and hypoadrenalism; for we read that "Esau became a mighty hunter and a man of the field," whereas "Jacob was a smooth man and dwelt in tents," what in the East to-day would be called a Babu.

In II Kings, Ch. 19, v. 3, it is obvious that uterine inertia was recognized as of grave onen to the women in labour, for one reads "This day is a day of tribulation and of rebuke, the children are come to the birth and the woman in travail had not strength;" and again in Jer. Ch. 15, v. 9, "she hath borne seven, is become weak and her soul hath fainted away."

In Gen. Ch. 35, v. 16, we have the tragic account of the death of Rachael. "And Jacob moved on in the springtime, and was still some distance from Ephrath when Rachael felt the pains of child-birth, she had hard labour, but in the midst of her hard labour, the midwife said unto her, 'Fear not, you are going to have another son,' and when her soul was departing for pain, and death was now at hand, she called the name of her son Benoni—the son of my pain." One wonders much what her death was due to,

for assuredly it must have been a bitter blow to Jacob after his long wait for Rachael. It is, I think, obvious that the presentation was normal, but the fact that labour came on while they were "on trek," suggests prematurity, for the "chosen people" do not travel during the tenth lunar month. Possibly placenta prævia, morbus cordis, or toxæmia of pregnancy caused the unexpected onset of labour; but if eclamptic convulsions had occurred they would have been mentioned. It is not improbable that a fibroid tumour of the uterus with the pregnancy may have been the cause, for in Gen. Ch. 31, v. 35, the text suggests that Rachael suffered from old standing dysmenorrhœa and menorrhagia; for Rachael states "let not my lord be angry with me that I cannot rise up before him, because it has now happened to me according to the custom of women."

In I Samuel, Ch. 4, v. 19, there is a wonderful clinical picture of precipitate labour, associated with cardiac shock and fatal syncope, the result of sudden emptying of a big uterus; "And the wife of Phinehas was big with child, and near her time, and hearing the news that the Ark of God was taken and her father-in-law and her husband were dead, she bowed herself and fell in labour, for her pains came upon her on a sudden, and when she was on the point of death they that stood about her, said to her, 'fear not for thou hast borne a son,' but she answered them not nor gave heed to them." This wonderfully graphic description cannot fail to appeal to any obstetrician who has seen a case of cardiac shock, colossal post-partum hæmorrhage, or acute inversion of the uterus.

There is a curiously sinister and graphic description in Num. Ch. 5, v. 21, which can be interpreted in various ways, but I think the probabilities are in favour of general peritonitis, or acute hydramnios, for it is written, "if thou hast gone aside from thy husband and art defiled, the Lord make thee accursed, and an example for all among His people. May He make thy thigh to rot, and may thy belly swell and burst asunder. Let the cursed waters enter into thy belly, and may thy womb swell."

In Job Ch. 38, v. 8, we find a picturesque description of sudden rupture of the membranes, which will remind many students of their days 'on the district.' The passage runs, "who shut up the sea with doors when it broke forth as issuing out of the womb."

Finally, it is interesting to note that there are no references to the pangs of child-birth being pleasurable, or easy. Among other quotations we have that of Gen. Ch. 3, v. 16, "I will make child-birth a sore pain for you, you shall have pangs in bearing, yet you shall crave to have your husband and he shall master you."

Women of Great Britain have to thank Queen Victoria who was the first to popularize the use of anæsthetics during child-birth, and it cannot fail to be a matter of pride that the original chemical discoverer of chloroform, (though it was first used by Sir James Simpson) was a member

of this learned Society and lived here. I refer, of course, to David Woldie whose honoured bust is in your Hall.

PUERPERIUM.

It is curious to note that, beyond the immediate death of Rachael, and the wife to Phinehas, and presumably Thamar, there are no references to anything that would indicate puerperal sepsis, although, as I have previously pointed out, the "obstetric hand" of Job. Ch. 26, v. 13, would appear to suggest recognition of operative or manipulative midwifery.

Perhaps it was of such that it is written in Ecclesiasticus, "Honour the physician for the need thou hast of him, for the Most High hath created him. The skill of the physician shall lift up his head, and in the sight of great men he shall be praised." It is not impossible, however, that the son of Sirach inferred the meddlesome midwife when he wrote the bathos, "He that sinneth in the sight of his Maker shall fall into the hands of the physician." But all the same, worthy or unworthy, a physician was entitled to his expenses or fees! vide Ex. Ch. 21, v. 19.

In the case of a male birth the puerperium lasted 33 days and coitus was forbidden before that date. In the case of a female child 66 days had to elapse before purification or coitus. No adequate explanation for this differentiation can be put forward.

GYNÆCOLOGY.

There are not many references to gynæcology, though there are very exact rules, regulations, and medico-legal enactments as regards rape, incest, consanguineous marriages and prostitution. One of the earliest and most characteristic stories of rape is in Gen. Ch. 34, with its tragically amusing sequel in verse 25, for this is the first reference to minor clinical surgery in the Bible; "The men of Shechem had consented to be circumcised in order to legalise the marriage of their chief to Dinah, whom he greatly loving had ravished"; and it was written "The circumcision was done on all the men, and behold the third day when the pain of the wound was greatest, the sons of Jacob entered boldly into the city and slew them."

Apart from the tragic side of the vengeance, this incident is of great gynæcological and sociological importance, for it creates a new point of view as regards women in ancient times. Throughout the world up till then, the neolithic idea of women, as so much property, existed; and compensation for injury to such property was all that was demanded. Here, however, we find that the idea of purity has entered the Hebrew mind, and a law is made imposing the death penalty for infidelity in marriage or for the seduction of an affianced girl. Moreover, the penalty of marriage is created, for a man, seducing an affianced girl, is compelled to pay her price and to take her for wife. From this we must

assume that here we see the dawn of emancipation for women, for up till then they were steeped in an inferiority complex.

In the days of the Patriarchs a woman did not exist until she was married, and even then we have the instance of the wife of Joakim carrying the load of inferiority which was hers as a girl, though she was innocent of the charge of infidelity made against her.

The story of Judith and Holofernes indicates, perhaps, the degree of emancipation reached; and for those who are students of Schopenhauer, Otto Weiniger, or Ludovici, it will not come as a surprise that 2500 years ago there was shown for women a great contempt as well as a great respect. We find Ecclesiasticus urging "man not to be jealous of his wife but to keep his soul from her." "He is to beware of a woman who sings, he is to turn away his eyes from a beautiful woman, because beauty is a snare. He is not to look upon another man's wife. He is to fear wine and woman, for a woman is either a reward or a punishment."

The sin of Onan (Gen. Ch. 38, v. 10,) would appear to foreshadow one of the present modes of birth control, and to indicate "withdrawal." There is nothing in any of the texts to suggest that masturbation is inferred. It is obvious that such a method was considered an abomination, and was looked upon as unhealthy, as indeed it is for both parties. Moreover, up to the present day this and all such methods are taboo among orthodox Jews, wherefore they multiply.

Lastly, there is the well-known incident in St. Mark Ch. 5, v. 25, which is so invariably quoted by Christian Scientists: "And a woman who was under an issue of blood 12 years, and had suffered many things from many physicians, and had spent all that she had, and was nothing the better but rather the worse, when she heard of Jesus, came in the crowd behind Him and touched His garment, for she said, if I shall touch but His garment I shall be whole. And forthwith the fountain of her blood was dried up and she felt in her body that she was healed of the evil. And He said to her, 'Daughter, thy faith hath made thee whole, go in peace and be thou whole of thy disease'."

"Well ordered words are as the honeycomb, sweet to the soul, and health to the bones, and good instruction shall give grace."

SPECIAL REPORT.

THE SEVENTH CONGRESS OF THE FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE, held at Calcutta from Dec. 5th to Dec. 10th, 1928.

(PART II.)

(Continued from p. 148 of our issue for March 1928.)

DYSENTERY. SPRUE. BACTERIOPHAGE.

THESE subjects were dealt with in Section III of the Congress on December 7th at the morning and after-

noon sessions. The Section was presided over by Professor K. Shiga of Japan, of Shiga bacillus fame.

The Section was opened with a paper by Mr. A. C. Ukil, M.B., on the dysenteries of Bengal. On an analysis of 1,500 cases observed he stated that bacillary dysentery was commoner than amœbic in Bengal; that organisms of the *Salmonella* group were responsible for some cases; that cultural studies of the intestinal contents of flies showed that they might prove to be of importance in the aetiology of dysentery; whilst the role of the intestinal flagellate protozoa was discussed. During the discussion which followed this paper various speakers emphasized that bacillary dysentery is far more common in India than amœbic, the proportion of the former to the total number of cases being given by various speakers at from 66 to 90 per cent.

A joint paper on recent work at Parel on sprue by Lieut.-Col. F. P. Mackie, O.B.E., I.M.S. and Dr. Hamilton Fairley was read by the former author. These workers had found *Monilia psilosis* in cases of diarrhœa which were not sprue, and had found it very toxic to rabbits. Study of the liver function in sprue by the lœvulose tolerance and other tests had shown that in sprue the liver function is not at fault. There is but little evidence of any serious derangement of the pancreas. A study of the morbid anatomy and histology of the disease does not show any pathognomonic lesions, and it is difficult to say whether the general mucosal atrophy present in the gut is the cause or the result of the disease. The changes in the bone-marrow bear out the contention that the anemia of sprue is of aplastic type. The commonest micro-organism isolated from the stools is of *B. morgani* type, whilst hæmolytic bacteria are common and may have something to do with the anemia of the disease. The authors insist that sprue is a clinical entity quite distinct from pernicious anemia. The blood picture of the two diseases is also quite different.

Three papers dealing with the bacteriophage were read by Professor d'Herelle, whose work on this subject is so well known, and were listened to with profound interest. The bacteriophage, he claimed, is a principle which produces the dissolution of bacterial cells and reproduces itself in the course of this dissolving process. This principle is present in the intestine of every man and animal; in normal individuals it develops upon saprophytic intestinal bacteria. During recovery from a bacterial disease, a bacteriophage principle, capable of dissolving the bacterial agent of the disease, is present in the intestine of the convalescent and even in certain organs.

During the last six years, several hundreds of papers have been published on the question of the nature of the bacteriophage. This question is a very important one, for it has a repercussion on the study of a whole series of phenomena which constitutes bacteriophagy *in vitro* and *in vivo*, i.e., the experimental phenomenon of bacteriophagy and the natural process of bacteriophagy which occurs in the body in the course of infectious disease.

He had brought out a whole series of experiments (since confirmed by several authors), which show that the bacteriophage is composed of filter passing corpuscles; that these corpuscles are autonomous and possess their own properties, entirely independent from the bacteria at the expense of which they reproduce themselves; that these corpuscles possess the powers of assimilation and adaptation. Those various properties, autonomy, assimilation and adaptation, constituting the criteria of life, every being which possesses them is necessarily living "by definition."

The bacteriophage then is a filter passing parasite of bacteria, *Protobios bacteriophagus* d'Herelle, 1918, and the phenomenon of bacteriophagy in reality is the result of an infectious disease that prevails amongst bacteria.

In his second paper Dr. d'Herelle dealt with the relationship of the bacteriophage to epidemic intestinal diseases.

In the infectious intestinal diseases of man and animals, the end result, recovery or death, is intimately

associated with the behaviour of the intestinal bacteriophage.

In normal individuals, bacteriophage lives upon saprophytic intestinal bacteria. By a process of adaptation (experimentally demonstrable *in vitro*), which is more or less rapid according to surrounding circumstances, bacteriophage is able to parasitize any invading bacteria.

Experiments show that the patient invariably succumbs when the adaptation is lacking. In case of recovery, the improvement begins from the time when the bacteriophage isolated from the stools of the patient is capable of producing complete bacteriophagy *in vitro*.

The importance of the behaviour of the bacteriophage upon the course of an epidemic is as great as it is upon the process of the recovery.

At the beginning of an epidemic there are disseminated into the environment the pathogenic bacteria; this is the period of the propagation of the disease. Then from the first convalescent, there are disseminated bacteriophages which have acquired the power of killing and dissolving the pathogenic bacteria in his intestine. From this time more and more patients recover, bacteriophages become more and more disseminated, and the epidemic declines, finally to cease when "contamination" by bacteriophage becomes general.

Recovery and immunity are contagious in the same way and by the same means as infectious disease itself.

In his third paper, Dr. d'Herelle dealt with the treatment of cholera and bacillary dysentery by bacteriophage.

"In a preceding paper, I have pointed out that observations and experiments show that the behaviour of the bacteriophage is intimately related to the natural process of the recovery as well to the stopping of the epidemics. The best way to verify the truth of such a statement is to realize cross experiments, i.e., to reproduce both processes experimentally by employing cultures of bacteriophages.

In relation to bacillary dysentery, I treated in 1919 several cases of Shiga and Flexner dysenteries, giving 2 c.c. of a culture of a potent bacteriophage, to be taken by mouth. In every case all symptoms definitively disappeared within 24 hours, whatever the gravity might be. Since then bacteriophage treatment has been widely employed in Brazil and in the Sudan, where thousands of cases have been treated, and my first statement has been entirely confirmed.

I must strongly warn experimenters that cultures of *vacc* bacteriophages are entirely useless for the purpose of treatment.

In the course of the present year, thanks to the Indian Research Fund Association, and with the collaboration of Major Malone, I.M.S. and Dr. Lahiri, I have been able to make extensive researches in relation to cholera. In the great majority of cases the result of the bacteriophage treatment in cholera has been fully efficient.

We have also tried the stopping of village epidemics by spreading over potent cholera bacteriophages into the environment. To that purpose we have added 50 c.c. of a selected bacteriophage culture in the wells supplying the infected area. The first results have been extremely promising."

GENERAL MEDICINE.*

In this Section the session was opened by a paper by Lieut.-Col. F. A. F. Barnardo, C.I.E., C.B.E., I.M.S. on the importance of mixed infections in the practice of medicine in the tropics. He dealt with such conditions as streptococcal septicæmia as a complication of typhoid fever, with kala-azar as a sequel to enteric fever, and with ankylostomiasis and latent malaria as complications of many tropical diseases. The importance of recognising that a patient in the tropics is almost always suffering not only from a primary disease, but from other secondary infections or associated infections

which may complicate the clinical picture is very great.

There was considerable discussion after this paper, the various speakers all laying emphasis on the necessity for a general assessment of the various infections from which the patient was suffering, and for a due weighing of their importance in his clinical state.

This was followed by a paper by Lieut.-Col. C. A. Sprawson, C.I.E., I.M.S. on disseminated sclerosis in India. He claimed that the disease is non-existent or almost non-existent among Indians, and also in Mesopotamia, and discussed the reasons for this. In the subsequent discussion various speakers questioned this statement. Major V. G. F. Labernadie of Pondicherry followed with two short papers, and then Dr. U. P. Basu read a very informative paper on the scope of digitalis in the tropical heart of Bengal, illustrated by lantern slides. He first described the results of complete physical and auscultatory examination of 50 healthy adult Bengalis and 25 similar Europeans, with illustrative blood pressure tracings, radiographs of the heart, and electro-cardiograms. He then described the morbid anatomy and histo-pathology of a series of 50 hearts of persons between 25 and 35 years of age who had died suddenly as the result of accident. Under diseased conditions he contrasted the commoner cardiac conditions found in Indians in Calcutta with those for Europeans in Europe as seen in the cardiac clinics in London; also the cardiac complications of the common fevers and other common diseases of Bengal.

At the afternoon session Dr. J. W. Tomb, O.B.E. read a paper on the incidence and significance of certain clinical signs, such as intestinal cramp, vomiting antecedent to purging, and blood-stained stools in the diagnosis of cholera and its treatment. Rai Lal Behari Ganguly Bahadur then read a paper dealing with the present day treatment of cholera, based upon his many years' extensive experience in the treatment of the disease at the Campbell Hospital, Calcutta. In general treatment with hypertonic salines was of special value, and several of the newly introduced remedies, such as the essential oils, did not seem to improve matters. His paper was followed by a short discussion.

The session on Tuesday, Dec. 6th, was devoted to a discussion on diabetes and it was resolved (with the consent of the chairman) to divide the discussion into two parts, Part I dealing with the bio-chemical aspects, and Part II dealing with the clinical side.

The opening paper in Part I was contributed by Major H. Stott, I.M.S. (Lucknow). The speaker remarked that the race factor *per se* had no influence on the blood-sugar level. He pointed out that though the normal fasting blood-sugar level in Indians was usually higher than in Europeans in an equal state of health, experience gained in the war had demonstrated that healthy Indian sepoys on a mixed diet and doing hard physical exercise had a fasting blood-sugar level similar to that of Europeans. His opinion was that a fasting blood-sugar level above 0.15 per cent. should be considered abnormal. The speaker next discussed the question whether the so-called "alimentary" glycosuria could be separated off from the true pancreatic diabetes. He considered that from the point of view of blood-sugar estimations such a separation could not be effected though it might be possible clinically.

The second paper in this section was read by Capt. S. L. Bhatia (Bombay). He gave an account of a series of blood-sugar estimations on apparently normal Indians in Bombay. His conclusions were that the average fasting level of blood-sugar was a little higher and the sugar tolerance a little poorer in persons who lived on a purely vegetarian diet rich in carbohydrates than in those who lived on a mixed diet of meat and vegetables. He said that glycosuria often followed the administration of 50 grammes of sugar in some of these apparently normal vegetarian Indians, and he believed that it was the "alimentary" type and was mainly dietetic in origin.

Dr. J. P. Bose (Calcutta) was then invited to discuss. He agreed with Major Stott that race *per se* had no influence on the blood-sugar level. The fasting level

* Report by Dr. J. M. Henderson, Calcutta School of Tropical Medicine.

of blood-sugar may vary, though slightly, due to habits of a particular race. For instance a normal Bengali, living on mixed diet and doing ordinary physical exercise usually has a blood-sugar quite comparable to the European standard (average 0.100 per cent). On the other hand, the fat indolent type of Bengalis may show a fasting blood-sugar level of 0.12 per cent. In his opinion persons having a fasting blood-sugar level over 0.13 per cent. should be considered abnormal and should be classed under "potential diabetics."

The speaker did not agree with Capt. Bhatia's findings about the sugar tolerance in apparently normal vegetarian Indians. He considers that to have hyperglycaemia over the kidney threshold and to pass sugar in the urine after a test meal of glucose is distinctly pathological. He objected to the use of the term "alimentary glycosuria." He remarked that in a normal healthy person it is impossible to induce the blood-sugar to go over the renal threshold however large an amount of sugar be given.

Major S. S. Sokhey, I.M.S. (Bombay) thought that the "respiratory quotient" should receive more attention in investigating cases of diabetes.

PART II.

Major Stott then read the second part of the opening paper. He dealt first of all with the frequency of diabetes in India. The type of diabetes met with in India is usually of a rather chronic nature and is attributable largely to dietetic and social conditions. With regard to the more acute type of diabetes (commonly met with in young people) the speaker has found that no fewer than 50 per cent. of his cases in patients under 25 years of age showed a positive Wassermann reaction. Major Stott then considered the question of the renal threshold level for excretion of sugar and pointed out that a "high" renal threshold sometimes occurs in advanced cases of diabetes and in chronic intestinal nephritis. He divided the cases of chronic (dietetic) diabetes into 4 stages; (a) stage of hyper-glycaemia; (b) stage of intermittent glycosuria; (c) stage of chronic glycosuria; (d) terminal stage with complications. The speaker concluded his paper by showing a series of lantern slides illustrative of typical cases treated in hospital at Lucknow.

The second paper in this section was read by Dr. M. M. Dutt (Calcutta) who gave an account of his experience of diabetes in Bengal. The speaker believed that infection plays a very important part in the etiology of diabetes. He deprecated the practice of "starvation treatment" in the disease and outlined a regime which he had employed for some time with considerable success, which consisted of supplying to the patient, sufficient calories for his daily requirements.

Lieut.-Col. J. D. Sandes, I.M.S. (Calcutta) was of opinion that even now the treatment of diabetes could not be deemed particularly satisfactory. The original "Allen treatment" had fallen far short of expectations and had to be considerably modified. He gave a brief outline of his clinical experience with diabetes.

Lieut.-Col. C. A. Sprawson, I.M.S. dealt with the question of diabetes complicated by other diseases like nephritis, syphilis and tuberculosis, and pointed out the necessity of treating such diseases along with diabetes. Such complications frequently obscure the clinical picture, e.g., in diabetes complicated by nephritis the patient dies of uraemia, and not of diabetic coma.

In the discussion which ensued various points arose; several speakers expressed surprise at the high percentage of positive Wassermann reactions found by Major Stott in his young diabetics and enquired regarding the general consensus of opinion regarding syphilis as a predisposing cause of diabetes. Dr. Bose remarked that only 2.5 per cent. of his cases gave a positive Wassermann reaction.

A member advocated the use of an extract from the leaves of the plant *Gymnema sylvestre* in diabetes. Major Sokhey and Dr. Bose gave their experiences with this line of treatment. They had formed the opinion that it was quite useless.

Major Stott having briefly replied, the proceedings of the Section terminated.

STATE AND PREVENTATIVE MEDICINE.

This Section was opened with a paper by Colonel J. D. Graham, C.I.E., I.M.S., Public Health Commissioner with the Government of India, on the international aspects of disease with special reference to quarantine. He reviewed briefly the various factors leading up to the present co-ordination of different national and international activities directed towards a more accurate knowledge of world-epidemiological conditions, and the simplification of quarantine. The procedure of the Office Internationale d'Hygiene Publique and of the League of Nations Health Section was outlined, and their relationship with India discussed. Dr. McVail contributed a paper giving an account of quarantine conditions in the port of Calcutta.

A paper in this Section which aroused considerable discussion was one by Lieut. Col. A. J. H. Russell, C.B.E., I.M.S. on the problems of population and public health in India.

He referred to the population curves devised by Professor Raymond Pearl, and said that he had applied the methods suggested by Professor Pearl to the population of India as a whole, and to the populations of various provinces and towns, and come to the conclusion that in India populations were now tending to approach their "constant" maximum point. He deduced from this that there had been already serious overcrowding in India, and advocated a bettering of the stock by more attention being paid to the normal, clever and promising individuals.

These views were combated by Col. Gill and Col. Bisset who pointed out that in the past public health measures had begun by attention being paid to the poor and the diseased and that the betterment of the race had undoubtedly resulted from an application of these principles. They also pointed out that Col. Russell's mathematical conclusions were based on the assumption of certain "constants" and that these "constants" might easily vary from year to year and specially so in a country like India, where conditions were at present unstable, and were likely to be so for a long time.

Col. Gill held that an increase of population, far from necessarily being an evil, might stimulate individuals and nations to developments in the science and art of food production. The questions underlying these problems, he said, were too large, and too fundamental to be adequately discussed within the short time at their disposal. They were nevertheless of extraordinary importance, not only to medical men, but also to administrators and statesmen.

Dr. Crow, Port Health Officer, Rangoon read a paper on de-ratting of ships, in which he discussed the relative value and cost of different methods. The cost of fumigating a vessel falls on the shipping company concerned, and "grape shot methods" of fumigation are costly and lack precision. If the number of rats destroyed is taken as a criterion of rat infestation, then fumigation, its cost, and the delay to the ship is not justified, particularly as trapping failed to elicit any undue rat population in some of the vessels. The cost per rat killed by fumigation might be anything from 8 annas to Rs. 195. Rat trapping and rat searching can always be relied upon to give an index of the numbers of rats on any one vessel, and to indicate whether fumigation is or is not advisable. If the store-room, the galley, and the crew's quarters are made as rat-proof as possible, there is a considerable diminution in the number of rats on the vessel. On the other hand rat-proofing in the tropics is apt to interfere with the necessary ventilation.

Dr. J. N. Leitch gave an account of a health campaign among 7,000 tea garden coolies in Assam. The following is a summary of his paper:

An attempt has been made to evaluate the various factors in disease prevention, as experienced in a health

campaign extending over some three years, and involving about 7,000 tea garden coolies.

The initial difficulties were threefold. Firstly, the hospital records had not been kept on any system, so that no useful information could be obtained from them. Statistics were incomplete and misleading.

Secondly, different methods prevailed on different gardens, involving all dealings with disease and sanitation. These led to confusion and there was no basis on which results could be compared.

Thirdly, there was no standard of comparison, such as normal weight, height, and general physical measurements, as European tables are not applicable to such a population.

An attempt was made to overcome these difficulties. The sick registers were revised, and a nomenclature of diseases insisted on. A monthly health return form was adopted and has since been in regular use. A medical history sheet was elaborated to record all points of importance in logical order and eliminate the personal element as far as possible. A scheme of standard treatments was drawn up, the principles of which were insisted on, so as to compare the results obtained.

By special parades extending over some three months, the whole population underwent a thorough physical examination, the results of which were recorded and classified. Treatment followed where necessary. A temporary laboratory was fixed up to help with the pathological work involved. Each illness has since been entered on to the patient's history sheet.

Attention was then directed to buildings and sanitation. The lines in which the coolies lived were in some cases irregular, difficult to drain, and dilapidated. Water-supply was crude and there was no means to prevent pollution. Sanitary measures consisted in a clean-up once a year only. Latrines scarcely existed and fecal infection of the soil was heavy. These points were illustrated by lantern slides, and showed the reconstruction which is now going on to remedy them.

Other measures include emergency treatment boxes on all out-gardens. Inspection of coolies is made fortnightly on pay days, and there is a house to house inspection of the lines daily. Carriers of disease are detected whenever possible and put under treatment. Fly and mosquito campaigns are going on, sanitary gangs are working in each line. Clinics have been started for child welfare, venereal diseases, leprosy and kala-azar. Weekly lectures on medical subjects are given to the hospital staffs. Health demonstrations aided by coloured posters are given to the coolies.

These activities are illustrated where possible, and details are given as to their results.

The present hospitals are quite unsuitable and inadequate. Plans are shown of the new ones now in course of erection and these are explained. The proposed administration of these hospitals is considered in detail. At present the patient's relatives are given leave to look after him, and this often results in very bad nursing and the giving of unsuitable food. The wards of the new hospitals are very much larger than those of the old, and it is proposed to have a trained attendant on duty night and day in charge of each. Accommodation is arranged for a pathological laboratory, an operating theatre, and a lying-in ward. A separate outpatient block is provided so as to keep the main hospital as clean and quiet as possible.

Results obtained to the date of writing are given.

Smallpox, of which there were always odd cases and occasional severe epidemics, has been completely abolished. The two or three cases occurring during the last year were strangers from surrounding villages, who came into our lines. All our own coolies have been vaccinated within the last 18 months.

Malaria has been reduced considerably, dysentery is much less than before, cholera is almost unknown. Other diseases are also decreasing as shown by the tables given. The birth-rate is rising considerably. There is a decrease in the death-rate of working coolies, but an increase in that of young children and of old people.

This is only apparent and is due to the more careful keeping of records.

The conclusions to be drawn from this work are as follows:

To prevent disease, no one method is adequate, but every method must be combined and persisted in.

The most important factor is to assure a thorough cure of each patient, and for this "follow-up" treatment is necessary. This is impossible without keeping careful records. The elimination of "carriers" thus accomplished probably does more than anything else to reduce disease.

The second factor is a good water-supply and conservancy system. Apart from malaria, probably some 90 per cent. of sickness is due to this lack. Evidence is produced to show the ravages of bowel diseases and worm infestations.

The third factor is adequate housing and sanitation.

The fourth factor is a first-class hospital and full equipment. This will not show an effect on the sick rate as much as the former factors, but will very materially reduce the death-rate.

The cost of disease is enormous, necessitating as it does the recruiting of new labour to replace wastage, outgoings in sick pay and attendances, lack of labour just when most needed to assure a large crop. It would be no exaggeration to put this cost at Rs. 3 per head per year.

The cost of prevention is also great, but not nearly so great as the former. Re. 1 per head per year for 5 years, followed by 8 annas per head per year or even less for perpetuity would be adequate to obtain the desired results.

Much is being accomplished by individual effort in an isolated way all over the world. When will these efforts be combined under one *generalissimo*, not only to fight disease but the callous indifference which perpetuates it?

Major J. R. D. Webb, O.B.E., I.M.S., Medical Officer of Health, Simla, read a paper on the medical inspection of Indian school children at Simla. This was systematically instituted in September 1923.

Simla with its season population of about 45,000, collected within a restricted area, is perhaps particularly well situated for work of this nature. Until December 1924, only the primary classes of boys between the ages of 6 to 11 years were dealt with. The total number so handled was 731. In late 1924 the work was extended to all boys' schools at Simla, while in 1926 all girls attending schools came under medical supervision. At the present time it is estimated that there are about 2,500 boys and about 600 girls who are under regular medical inspection at the 27 schools in Simla. The cost is estimated at approximately one anna per child per mensem, excluding the cost for instruments, printing of stationery and medicines.

The system of medical inspection at Simla which is now in practice has been evolved by closely studying similar systems in other parts of the world.

The system embodies:—

(1) The medical inspection of each child once every two months, with a view to the prevention and cure of disease.

(2) The assured treatment of affected children.

(3) Reports of the above results, which are combined to form an annual report.

(4) A monthly inspection of school premises, followed by reports combined to form an annual report.

The Simla population is very largely a seasonal one, fluctuating with the change of Government office employees. Changes amongst the children we are dealing with are inevitable. This tends to retard the rapid and complete success of the work. The following are the results obtained during the past four years:—

During 1923-24, out of 731 boys examined, 67 per cent were referred for treatment at the first inspection, whereas this figure was reduced to 33.03 per cent by the end of 1924. As already stated, during 1923-24, only the primary classes at the boys' schools were dealt with, consequently these results do not direct comparison

with those of subsequent years. In 1925, 81 per cent. of the boys were referred for treatment at the first series of inspections, while by the end of the year, this figure was reduced to 30 per cent. In 1926, at the first series of inspections, 43 per cent. of the boys and 75 per cent. of the girls were referred for medical treatment, also 45 per cent. of the boys and girls were recommended for attention by the masters and mistresses for uncleanness and other minor conditions. By the end of the year, these figures were reduced to 15 per cent. of the boys and 43.2 of the girls requiring further recommendation for medical treatment, while 21 per cent. of boys and 20 per cent. of girls still required attention by the masters and mistresses. In 1927, at the first series of inspections, 39.6 per cent. of the boys and 63 per cent. of the girls were recommended for medical treatment while 44.7 per cent. of the boys and 37.3 per cent. of the girls required attention by masters and mistresses. Averages of height, weight and chest measurements for Simla school boys and girls of varying ages were prepared in 1925-26.

The boys and girls now attending the 27 schools at Simla are of good physique and they comply with the standards already referred to. These results have been achieved by constant medical supervision and treatment, together with a system of regularised exercise by a *games-for-all movement*, and with a scheme for the supply of midday meals for the children.

"Observations on the Activated Sludge Process in Calcutta" was the title of an interesting paper read by Lieut.-Col. A. D. Stewart, I.M.S., Calcutta School of Tropical Medicine in the Hygiene Section.

Col. Stewart began by stating that in India safety and freedom from nuisance and danger usually had to be subordinated to questions of expense. Large towns are comparatively few, and as it is only in these that enough money is available for modern sewerage systems, the mass of the country must for a long time put up with comparatively primitive methods of nightsoil disposal. That biological processes can be successfully worked in India had been demonstrated by the number of septic tanks and latrine installations in Bengal and elsewhere.

These were somewhat expensive, however, and it could not be said that they were free from nuisance. The activated sludge process, the newest of the biological processes, had so far given satisfactory results, and it was desirable that this process should be examined as much as possible under the varying conditions of Indian climates and circumstances.

Briefly, the process was one by which a sludge rich in purifying element was first prepared. This, mixed with raw sewage in the proportion of 10 to 15 per cent. of sludge, and aerated with agitation, should in the course of a few hours produce a fluid out of which the sludge settles quickly, leaving a supernatant fluid which is safe, aseptic and inoffensive.

The disposal of the sewage of Calcutta was at a critical stage of discussion at the moment, and for that reason it was desirable to ascertain if the Calcutta sewage lent itself to purification by this process.

After describing numerous experiments with the process recently carried out in Calcutta, Col. Stewart held that in view of the experiments Calcutta sewage at its outfall from the city could easily be purified with four hours aeration with an active sludge. It had to be remembered, he pointed out, that Calcutta sewage was comparatively weak and had undergone a certain amount of decomposition by the time it reached its outfall.

MATERNITY AND CHILD WELFARE.

In this Section the discussion was opened by Dr. Ruth Young of the Lady Chelmsford League in a paper on the organisation of child welfare work, and obstacles in its way. She emphasised the necessity for the co-ordination of voluntary and official child welfare organisations under the supreme control of the Director of Public Health in each Province, and the appointment of medical women with special aptitude for the work at the head of each centre.

The reduction of infantile mortality, Dr. Young pointed out, is a somewhat negative appeal, and nowadays it is realized that all the positive factors that encouraged health, *ipso facto* reduced infantile mortality, and that the net cost of child welfare work is much wider than was originally supposed. Its ramifications extend in many directions, for example, into the realm of general hygiene, the study of propaganda work and its psychology, and educational work among future mothers now girls at school.

Objections to child welfare work were still heard, though the opposition was, for the most part, simply inertia rather than positive action. In India the ordinary member of a municipality often enough said: "What is the good of this work? We cannot see that it achieves anything." The most thoughtful person said: "India is over-populated as it is. Why save more babies? Better let them die so that those which do survive may have a less bitter struggle for existence."

Neither of these points of view could survive if people comprehended the real nature of child welfare work. Preventive ideas had gained ground in the West, and were now being appreciated by ordinary people. This process had scarcely begun in India. Prevention was not applied, even by the educated to obvious diseases, such as plague, cholera, and smallpox, though its success had been amply demonstrated.

Up to now there were very few perfect child welfare schemes in India, and many people had been "put off" by the way in which the work had been undertaken. When one visited various welfare centres and one saw the mistakes that had been, and were still being made, one could not but acknowledge sadly that objections on this ground were too often valid.

In many places one saw the centre whose work should be preventive turned into a dispensary, and a very inferior one at that, or into a place where charity was doled out. No attempt was made to follow the history of infants by means of regular visiting, ante-natal work was not organized, nor was there any teaching of mothers. The work was carried on by those who were poorly trained, and with insufficient education to carry it on their own initiative.

In India, welfare work up to the present consisted chiefly of scattered bodies in various towns working independently of each other. The combination of "official"—that is, municipal and governmental—and voluntary societies was the commonest method of work, and on the whole was the best method under present circumstances in India. A voluntary committee was more elastic in its methods than an official one and had more of what, for want of a better word, was termed "soul." In such cases the "official" representatives on the committee exerted a steadying influence on the less experienced but more spirited "non-officials."

The relation of all these bodies to the existing public health authorities was somewhat loose, and tended to overlapping and a rivalry that was detrimental to the work as a whole. The Directors of Public Health were usually in sympathy, and sometimes lent active aid, but they had no legal power either to advise or control.

This was a serious weakness, and pointed to the need of an inspecting and supervising authority for each province, or at least for each larger province. What was lacking in India was the "third member" in the partnership between voluntary workers, local authorities, and the State. There might be excellent financial and other reasons why that was so, but it was a great weakness, and until it is remedied they could not build their child welfare work on a firm and lasting foundation.

Dr. Young advocated the provision of grants by provincial councils in the budget of the Directors of Public Health. She also advocated the appointment of a whole-time medical woman, with special experience of child welfare work and an aptitude for organization, working under the Director of Public Health.

They ought also to press for the improvement of the registration of births which was known to be defective. Training of *dais* was another point which merited their serious attention; they should be induced to attend classes

for instruction. If the municipality was progressive, it might be able to enforce the attendance of *dais*.

Among the accessory activities advocated by the lecturer were sewing or hygiene classes for mothers, the supply of milk or foods, and propaganda work. She deplored the lack of voluntary workers in India. Indian women were hindered from taking up the work by lack of education, lack of leisure, and by social customs which placed obstacles in the way.

Dr. Young referred to the necessity for providing training centres for women doctors. It was difficult to get the right type of character, apart from intellectual ability. Yet that was essential in this work. The placing of medical women in charge of maternity and child welfare schemes was an excellent move, but had one or two drawbacks. In the first place, the idea underlying it in the minds of the committee was often one of so-called economy. They thought it cheaper to have some one who could do both curative and preventive work. The effect on the work was disastrous.

Education of the people until they understand the advantages to the community of child welfare work was essential. Child welfare work must necessarily be a slow process, but it must take effect ultimately, and the educational work would, at the same time, sweep away the other existing difficulty of illiteracy.

Concluding, Dr. Young said she was convinced that the rise of the general level of education in India would achieve more for the progress of child welfare work than any other factor.

OBSTETRICS AND GYNAECOLOGY.

This Section was presided over by Dr. Kedar Nath Das, C.R.E., the distinguished Principal of the Carmichael Medical College. Dr. Margaret Balfour read an exceedingly interesting paper summarising the results of her two years' enquiry into the causes of death during pregnancy and labour in India.

Two hundred and forty-four deaths had occurred among a series of 11,343 cases analysed. The causes of death were as follows:

	Deaths	Percent.
Anæmia of pregnancy	87	35.65
Puerperal sepsis	43	17.62
Eclampsia	25	10.24
Osteomalacia (its consequences) ..	22	9.01
Hæmorrhage	29	11.88
Other complications of pregnancy and labour	38	15.57

When these figures are compared with similar figures from other countries it appears in a general way that in India accidents and complications of labour are fewer, but the diseases of pregnancy are much more frequent.

(a) *Anæmia of pregnancy* resembles Addison's pernicious anæmia but differs from it in its more sudden onset, its more rapid course and its lack of remissions. It occurs in all parts of India.

The symptoms usually commence after the middle of pregnancy. Fever is often an initial symptom, followed by œdema, swelling, pallor, weakness. In 38 per cent. of a series of 150 cases diarrhœa occurred, in 40 per cent. vomiting, in 31 per cent. sore tongue, 29 per cent. were primipare. Death occurred in 42 per cent. of the cases, most often within 24 hours of delivery, but was sometimes delayed many weeks. 53 per cent. of infants were stillborn and another 15 per cent died a day or two after birth. None showed signs of anæmia.

In the blood picture the red cells were much reduced, the colour index was high. There was rarely leucopenia. Blood platelets were absent or scanty. Anisocytosis was always present, poikilocytosis usually so. Nucleated red cells were present in about half the cases. Post-mortem examinations were rarely possible but in two cases evidences of hæmolytic were found in the liver and spleen and aplastic areas were present in the bone-marrow.

(b) *Eclampsia*.—Its incidence varies both as to frequency and severity in different parts of the country.

(c) *Osteomalacia* occurs most frequently in the Northern and Central parts of India, less frequently in the West, and is absent from the South. It is believed to be due to a deficiency of Vitamin D. or lack of sunlight but this does not explain its unequal distribution in parts of India.

The influence of community.—In India speaking in a broad sense we have 3 communities of women living side by side, subject to the same climatic and housing conditions, equally exposed to endemic and epidemic diseases but differing as regards certain important particulars, namely, diet, literacy, domestic habits and customs relating to marriage and childbirth. These communities are the Hindu, Mahomedan and Christian. Particulars relating to the incidence among them of the chief diseases of pregnancy were obtained by means of a questionnaire sent out and are shown in the tables on p. 217.

It will be seen that both tables show the incidence of all three diseases to be greatest among Mahomedan women and least among women of "other" class who are very largely Christians. Some details follow showing the proportion these cases bear to the number of births in Bombay and the size of the different communities in India.

Facts regarding the different communities which might influence the incidence of the diseases of pregnancy are:—

- (1) Literacy.
- (2) Diet.
- (3) Early marriage.
- (4) Consanguineous marriages.
- (5) Domestic habits.

In conclusion the author pointed out that India should be an ideal country for obstetric research but workers are hampered by the difficulty of getting information from the records of most maternity hospitals. Records are kept in accordance with requirements of the Local Government for its annual report. All that the Government of Bombay requires is:—

1. The number of normal labour cases.
2. The number of abnormal labour cases.

The number of deaths.

Some Local Governments do not even require so much.

The numbers of different obstetric operations done have to be filled in, but not the causes which rendered them necessary. Hence these particulars are often not noted down on the hospital case-sheet and much valuable information is lost. The information contained in the Public Health Reports of large towns is also scanty although in some towns many of the deaths in childbirth are certified by medical practitioners. If Local Governments would require information as to the diseases of pregnancy from aided maternity hospitals and wards, and medical officers of health would enter anæmia of pregnancy and osteomalacia (as a contributory cause) under their death headings, much more light would be thrown on the conditions of childbirth in India.

Dr. Balfour's paper was followed by one by Dr. A. Emmanuelov and Dr. M. M. Mehta on the results of bacteriological investigation of the fæces and urine in cases of the anæmia of pregnancy, contrasted with normal controls. The principal pathogenic organisms isolated were the *Bacillus welchii* and streptococci, and their methods of identification and separation and their pathogenicity were discussed.

Dr. Agnes Scott then read a paper on osteomalacia in India. The disease shows a curious geographical distribution in this country. It is practically absent from the Madras Presidency; but very prevalent in Northern and Eastern India and in Kashmir. Hindus, and especially the *bania* and *kshattia* castes are affected in North India; in West India it chiefly affects Mahomedans. The chief predisposing causes are insanitary conditions, lack of sunlight and of exercise, whilst the disease is practically confined to women of the child-bearing period. The influence of child marriage, prolonged lactation, and the purdah system were discussed. Tetany is a common

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Incidence of osteomalacia, eclampsia and anæmia by community in Bombay Hospitals.

Community.	Total number of cases.	Proportion to total births in community.	OSTEOMALACIA.		ECLAMPSIA.		ANAEMIA.	
			Number of cases.	Ratio per 1,000 labour cases.	Number of cases.	Ratio per 1,000 labour cases.	Number of cases.	Ratio per 1,000 labour cases.
Hindu ..	2,066	14%	6	2.9	8	3.8	83	40.1
Mahommedan ..	842	23%	32	38.0	14	16.6	79	93.8
Other ..	801	44%	nil	..	3	3.7	39	48.6

Incidence of osteomalacia, eclampsia and anæmia by community in All-India Hospitals (less Bombay).

Community.	Total number of cases.	Ratio to total births in community.	OSTEOMALACIA.		ECLAMPSIA.		ANAEMIA.	
			Number of cases.	Ratio per 1,000 labour cases.	Number of cases.	Ratio per 1,000 labour cases.	Number of cases.	Ratio per 1,000 labour cases.
Hindu ..	5,167	..	160	30.9	79	15.2	148	28.6
Mahommedan ..	1,273	..	79	62.0	31	24.3	36	36.1
Other ..	1,152	..	6	5.2	8	6.9	15	13.0

accompaniment. The general prevalence of the disease, as judged by the number of Cæsarean sections carried out for its results in 30 hospitals for women in North India was discussed, and an analysis presented of 73 cases of late rickets and osteomalacia observed at Delhi.

PROTOZOOLOGY, SPIROCHÆTAL INFECTIONS. TICK TYPHUS.

This Section met on Dec. 9th under the presidentship of Dr. Brug of Java. Lieut.-Col. R. Knowles read a paper on the influence of the thyroid gland on the course of a protozoal infection, viz. surra, due to *Trypanosoma evansi*. He showed that the control of the thyroid gland over resistance or susceptibility to such an infection was an indirect one; in animals fed on an intensive course of thyroid feeding an occasional animal might put up an amazing resistance; whereas in animals in which sub-total thyroidectomy had been previously carried out the disease assumed a hyper-virulent form. The trypanosomes apparently lived on the blood sugar; the content of this was controlled by the activity of the adrenals and the liver, and hence the thyroid control over the course of the disease was a partial and incomplete one.

The same author then read a paper by himself and his colleagues on the life-history of *Spirochæta anserina* in its vertebrate host, the fowl, and its invertebrate host, *Argas persicus*. The true life-cycle, as studied in fresh preparations under the dark-ground, appeared to differ from that described by Hindle and previous workers. In the fowl there was one attack only of fever, which either killed the bird, or at the crisis of which the spirochætes gathered into ever increasing tangles in the blood, became immobile and disintegrated. Tangle-formation in either host appeared to be the inevitable prelude to death of the spirochætes; there was no evidence of any intracellular phase of the parasite, and after the spirochætes had disappeared from the blood stream they could not be found in any internal organ, except—occasionally—in the brain. In the tick the course of the infection was relatively simple. The greater majority of the spirochætes gathered into ever increasing tangles in the

gut, became immobile, and disintegrated. The few survivors underwent a very rapid multiplication until there was finally produced a swarm of exceedingly minute and delicate forms—"tenue forms," as they might be termed, with a delicate terminal flagellum at each end. These now invaded the cœlomic cavity of the tick, and from it all the viscera of the tick, but especially the salivary glands, and in the female tick the coxal glands. Infection of the glands with the "tenue forms" was progressive, whilst the residual infection in the gut gradually died out, and the spirochætes in the salivary glands gradually grew up into the adult type of spirochæte and multiplied rapidly. Experimentally the tick became infective to the fowl at the 7th day—possibly earlier—and remained infective for some months at least.

Lieut.-Col. J. W. D. Megaw, C.I.E., I.M.S., then read a paper on a typhus-like fever which is probably conveyed by ticks. He brought forward evidence to show that this fever is widely and sporadically distributed in India. The disease is strictly sporadic and occurs in persons who have been living in jungle, and it does not spread from man to man, as does louse typhus. In several cases the onset followed within a few days after the bite of a tick, whilst in all other cases it was more likely that the disease was conveyed by a tick than by any other arthropod.

A similar disease had been reported from many other parts of the world, although the authors of the accounts concerned had sometimes wrongly regarded the disease as being dengue or paratyphoid fever. Animal inoculations had been singularly unsuccessful; the Weil-Felix reaction was usually negative, although in certain cases it was positive to certain strains of *Bacillus proteus* X 19, while negative to others. The probable reservoir of infection was a rodent of the wilds.

Dr. C. Strickland suggested that the possibility of transmission by a mite should be considered, as it had been shown that the virus of tsutsugamushi disease was transmitted by mites, in some cases without a local sore appearing. He also discussed the possibility of hares

and other wild animals serving as reservoirs of the disease. In reply Colonel Megaw agreed that arthropods other than ticks ought to be investigated, but held that all the evidence available pointed strongly in the direction of the tick. He emphasized the fact that tick bite had been proved to have occurred in several of the cases, and he believed that the other cases might well have been caused by the bite of ticks which had not been detected.

Dr. C. Strickland then read a paper on an epidemic of pseudo-typhus in Southern Queensland in 1925. It was popularly supposed that this epidemic had some connection with a mouse plague which was prevalent locally at the time; and he discussed in detail the applicability of the conclusions drawn from this epidemic to the sporadic typhus-like disease of India. A short discussion followed.

Dr. Otto Schöhl then read a paper on experimental frambœsia in the monkey, *Macacus rhesus*. This was illustrated by a series of magnificent lantern slides illustrating every phase of the experimental disease in the monkey, and its histo-pathology.

IMMUNOLOGY AND CHEMOTHERAPY.

This Section was presided over by Professor S. Hata, who, with Ehrlich, discovered salvarsan. He read a paper dealing with the factors influencing the therapeutic value of salvarsan solutions. At Professor Hata's suggestion, Professor Komatsu is carrying out an investigation at the Kitasato Institute on the changes in toxicity and in therapeutic value of salvarsan solutions when administered either simultaneously or admixed with other parasitocidal substances such as bismuth, mercury, and antimony. It has been found that the H-ion concentration of the solution has a marked effect on the therapeutic efficiency of neosalvarsan. The enquiry is at present continuing, and its results promise to be important.

Prof. Hata's paper was followed by a discussion. At the afternoon session the chief paper was one by Major R. B. Lloyd, I.M.S., on the clinical aspects of the Wassermann test.

"The object of this paper is to describe certain aspects of the clinical application of the Wassermann test as used in Bengal. With a reliable technique and adequate controls, the test is as valuable in the East as in the West. The first part of the paper refers to the positive reactions which have been reported in malaria. Some of the earlier reports were based on imperfect technical methods now discarded, and in certain instances the precautions taken to eliminate associated syphilis were clearly inadequate. Excluding certain papers which are defective in these two particulars, the weight of evidence is against malaria being responsible for a positive Wassermann reaction. The writer has specially examined this question, and finds no evidence that malaria causes a positive Wassermann reaction. This is a point of great importance as, were this so, the value of the Wassermann test in India would be in great measure discounted.

Secondly, yaws is a disease met with in India in which a positive Wassermann reaction is found as a regular phenomenon. This is a matter of no great practical importance as the lesions of yaws are characteristic.

The next part of the paper describes the work done during the last four years jointly by Dr. Muir of the Calcutta School of Tropical Medicine and the writer, who have investigated the causation of the positive Wassermann reaction in leprosy, chiefly from the point of view of the effect, clinical and serological, of anti-syphilitic treatment upon such cases. Earlier workers found a high proportion of Wassermann-positive cases in leprosy, and concluded that while syphilis is obviously accountable for certain of the positive fixations, yet there remains a considerable proportion not so due; and which they attributed to leprosy itself. We have examined the Wassermann reaction in the various types of leprosy, and have compared the percentage of positive reactions

obtained in a series of over a thousand definitely diagnosed cases with the syphilis rate of the Calcutta hospital population, which is estimated to be from 15 to 20 per cent. We find in the early or mild types of leprosy, both dermal and neural, that the Wassermann-positive percentage is within this figure; and of twenty-one cases of this class subjected to anti-syphilitic treatment, every one became Wassermann-negative; showing that all these reactions were due to associated syphilis. The case of the advanced dermal types of leprosy is more complex. Here 50 per cent. or more are found to give a positive Wassermann reaction. Of the Wassermann-positive cases in this class, three-fourths respond to anti-syphilitic treatment, the reaction becoming negative. The number of positive reactions met with in these advanced dermal types is found also to depend on the Wassermann technique employed. Kolmer finds with his new method, which has important technical differences from the methods ordinarily employed, that all positive reactions are due to associated syphilis. With what may be called "ordinary" modern techniques, there are, in addition to those due to syphilis, certain reactions which are falsely positive due to experimental factors. Our own results showing the effect of treatment indicate that a high proportion of positive reactions obtained by "ordinary" techniques in Bengal are due to associated syphilis, which is here present to an extent amounting to two to three times the syphilis rate. The most probable explanation of this is, we believe, that tissues damaged by the syphilitic virus probably form an excellent soil for the advance of the leprosy process; the result of which is that mild cases soon tend to pass into the graver forms of the disease, and therefore, the Wassermann-positive cases tend to accumulate in this category. Wassermann tests on leprosy cases are now a routine at the Calcutta School of Tropical Medicine; and in the event a positive reaction being obtained, anti-syphilitic treatment is given in the form of Avenyl, a new mercury compound, administered dissolved in hydriocarpus oil or esters. Apart altogether from the change in the Wassermann reaction, the clinical improvement in many cases of leprosy effected by this double treatment is very remarkable. Dr. Muir has found that Wassermann-positive leprosy cases are resistant to anti-leprotic treatment and a Wassermann-positive patient is never chosen when the effect of any drug is to be estimated.

The next part of the paper refers to the routine use of the Wassermann test in the examination of medical cases in the Calcutta Hospitals. As might be expected, many unsuspected cases of syphilis have been brought to light. Notes of some cases are given which were difficult of diagnosis clinically, and in which the Wassermann test was crucial; the correctness of the Wassermann finding being proved by the disappearance of the symptoms under anti-syphilitic treatment. A few notes are also given illustrating the part played by associated syphilis in preventing or delaying cure in other diseases, e.g., Wassermann-positive kala-azar cases tend to be resistant to specific antimony treatment, and operations for glaucoma may fail in a Wassermann-positive case.

In conclusion, the writer remarks that as the Wassermann reaction has attained its immense reputation by its concordance in an overwhelming proportion of cases with the clinical finding, it follows that the ultimate diagnosis of a case must be made by the clinician, who is always ready to appreciate the value of a test which, if properly performed, almost invariably gives a correct indication.

Major Chopra also read a paper by himself and Dr. S. Chaudhury on the physical properties of normal and pathological sera, of which the following is a summary:

The hydrogen-ion-concentration of sera has been determined by the hydro-quinhydrone method and their viscosity, gold number, conductivity and iso-electric point have been carefully worked out. There is a slight drift to pH to the alkaline side in the case of kala-azar sera. Viscosity of kala-azar serum is also a little increased, while no appreciable difference can be recognised

in the values of gold number and conductivity. The isoelectric point of kala-azar serum is definitely more alkaline than those of other sera. Incidentally, the precipitation produced by kala-azar sera with organic compounds of antimony can be explained on the basis of these physical constants. The coagulation value of these sera with $\text{Al}_2(\text{SO}_4)_3$ and FeCl_3 have also been determined. Gel formation with $\text{Al}_2(\text{SO}_4)_3$ has also been studied. It has been found that the concentrations of $\text{Al}_2(\text{SO}_4)_3$ at which leprosy and kala-azar sera form gels are distinctly different from those of the other sera. Explanation on the basis of the change of concentration of different proteins has been suggested. Experiments are being conducted to elucidate and correlate all these precipitations with electrolytes in the case of different sera.

Other papers in the Section were one by Dr. U. N. Brahmachari on the relationship between the antimonial compounds and their therapeutic properties, and by Major Labernadie on the carrying out of the Wassermann reaction without an incubator.

HELMINTHOLOGY.*

There were thirteen papers listed in this Section, but of these only seven were read; three were on filariasis, and the remaining four dealt with hookworm disease. Therefore, although the Section was somewhat limited in scope, the two most important helminthic infections affecting India were dealt with.

Colonel S. L. Brug of the Dutch East Indies Service, described what appears to be a new microfilaria found in the blood of human beings in several islands of the Dutch possessions in the East Indies. He based his opinion on its distinct morphological differences from *Microfilaria bancrofti*, and on the fact that as far as the investigation has been carried out the indications are that this microfilaria does not develop in *Culex fatigans*. He also pointed out that this discovery may be of importance in explaining the variation in the predominating symptoms of filariasis in different parts of the world.

The papers by Dr. Vishnu Korke on the findings in a filaria survey in the district of Gaya in Orissa, and by Dr. Sundar Rao, Calcutta, on the distribution, and manifestations of filarial infection in Calcutta are perhaps of more local than of general interest. The latter author showed that 10 per cent. of the population of Calcutta are infected, and that the infection is heavier in the more congested localities. Filarial fever is the commonest manifestation; the other lesions being elephantiasis, orchitis, chyluria, and abscess, whilst lymph-scrotum, lymph-adenitis and lymphatic varix are rare. *Culex fatigans* is the carrier in Calcutta.

Dr. Korke also contributed two papers on hookworm disease, as the result of an investigation at Gaya. In the first paper he showed that hookworm infection is heavier in the northern, more fertile, plains than in the hilly, more barren, portion of the district lying to the south, but there is more actual hookworm disease among the hill population than there is on the plains. This is explained as follows; the plains dwellers live under better conditions and are better fed than the hill dwellers; therefore the former can better resist a heavy infection than the latter. In his second paper he showed that the hæmoglobin index coincided with other evidence of the severity of hookworm disease.

Dr. J. F. Kendrick of the Rockefeller Foundation, who has been carrying out a hookworm survey in Madras Presidency for some years, gave a detailed account of this survey. He brought forward conclusive evidence that there is a close correlation between egg counts and the degree of anemia, and by the fortunate circumstance of being able to observe over a long period undoubted pure infections with *Ancylostoma duodenale* and *Necator americanus* he was able to prove that the pathogenic effect of the former worm is relatively much greater than that of the latter.

An account of a hookworm survey in Ceylon was given by Dr. W. C. Sweet of the Rockefeller Foundation. By the application of the egg counting method it was possible to express the terms of infection for the whole island as one in which fifty per cent. of the population had hookworm disease, rather than the ninety per cent. who were infected. He also expressed the opinion that too much rain may be as detrimental to the development of hookworm larvæ as is too little rain. This is a point of considerable interest, and enquiry on this question in many parts of the world might produce valuable information.

OTHER SECTIONS.

Considerations of space preclude us from going into details with regard to the other sections. In the Section on *Surgery*, the chief subject was filariasis, with the surgical aspects of which Sir Frank Connor, I.M.S., dealt, and Major K. K. Chatterji with its surgical pathology. The latter author also dealt with the surgical aspects of chronic and latent amœbiasis, much on the lines of the useful chapter in his recently published book on surgery in the tropics.

In the Section on Dentistry Mr. H. A. Taylor, I.D.S., read a paper on oral sepsis, and Dr. R. Ahmed, D.S., one on the relationship of *pan*-chewing to pyorrhœa alveolaris in Indians. He made out a very strong case for the baneful effects of this habit, and implored that every effort should be made to eradicate it, and to preach its evils to the people of India.

In the Section on Ophthalmology Lieut.-Col. W. V. Coppinger, D.S.O., I.M.S. read a paper on glaucoma as seen at the Calcutta Eye Infirmary, 1926-27. Glaucoma, he concluded, is not merely due to obstruction to the drainage of the eye, but is associated with a condition of loss of pressure equilibrium in the eye. Colonel Coppinger gave some very interesting facts with regard to the incidence and characters of the glaucoma of epidemic dropsy. Glaucoma was also dealt with by Mr. S. K. Mukerjee, F.R.C.S. of Calcutta in an able and informative paper. A very striking paper, and one illustrated by a very fine series of coloured drawings was that by Major E. O'G. Kirwan, I.M.S. on the ocular complications of leprosy.

Of the Veterinary Section, we have unfortunately received no report; it was characterised by a miscellany of papers. In connection with the Scientific Exhibition a very fine series of exhibits was put up by the Imperial Veterinary Research Institute, Muktesar, by Mr. J. T. Edwards, F.R.C.V.S., and his colleagues. This was exhibited in the Pathology Department of the Medical College, and it is unfortunate that more people did not visit it, owing, largely, to the scantiness of direction posts, and being ignorant of its existence. The exhibit covered the whole range of the Institute's activities, and showed something of the very fine work being carried out at Muktesar.

In the Mental Hygiene Section Lieut.-Col. Berkeley-Hill, I.M.S. put in a strong plea for the study of the mental side of tropical diseases. The following is a brief summary of his paper. There is at present no mental side to tropical hygiene. Hitherto the subject of mental hygiene has met with little attention in tropical countries. Books on tropical diseases hardly mention mental disorders. There are two books which contain short references to mental disorder peculiar to tropical countries: Schaube's "*Krankheiten der Warmen Lander*" and Mense's "*Tropen Krankheiten*." In 1926, the Bishop of Singapore wrote to the *British Medical Journal* asking to be informed what is the cause of the upset of mental balance which is so common among Europeans in the tropics. To the Bishop's enquiry the *British Medical Journal* published eight replies from various doctors. The amazing diversity of opinion expressed in these letters only tends to show how ignorant we are about mental disorder, especially of the neuroses which beset Europeans resident in hot countries. Early in 1927 Lieut.-Col. H. W. Acton of the Calcutta School of Tropical Medicine, delivered before the Bengal Asiatic Society, a lecture entitled "Neurasthenia

* By Dr. P. A. Mapleston, D.S.O., Ankylostomiasis Research Worker, Calcutta School of Tropical Medicine.

in the Tropics." These examples practically constitute all that has been published about psychopathic disorder among Europeans in tropical countries. The principal mental disorder amongst Europeans in the tropics is probably an anxiety neurosis. The reasons for this: How the conditions of life of many Europeans in tropical countries favour the development of an anxiety neurosis. The treatment and prevention of anxiety neurosis. Other types of mental disorder. Tropical mental hygiene. What the French have done and are doing in the tropical colonies of France. What other European countries with interests in the tropics might do. What has been so far done in India. What might and should be done.

In the same Section Capt. J. E. Dhunjibhoy, I.M.S. read a paper on Indian hemp as a factor in the causation of insanity in India. The following were his conclusions.

Connection of Hemp Drugs with Crime.—Habitual use of hemp drugs degrades the mind and character of the consumer and predisposes him to crime in general. Thus the hemp is one of the most efficient means for increasing the criminal classes. It is also largely consumed by bad characters and badmashes to fortify themselves for crimes. Bhang is a very useful weapon in the hands of criminals for looting ornaments from prostitutes and children. Similarly, ganja generally mixed with dhatura and other potent drugs is a very useful weapon in the hands of criminal gangs to make an innocent man commit murder of another in order to suit their purpose. Unpremeditated crimes, especially murders or running amuck, are not uncommon occurrences with sudden large doses of hemp drugs.

Conclusion.—The Indian Mental Hospital at Ranchi has a male population of 1,200 and the history of indulgence in hemp drug could easily be traced in 30 to 40 per cent. of this population. On analysis of 1,200 cases it was found that in cases of 138 patients history of indulgence in hemp drugs was strongly corroborated by (1) Descriptive Roll which is usually filled up by police after due enquiry from the relatives and friends of the patients.

(2) Patients' own statements, and

(3) Peculiar eye condition mentioned above.

In other cases one or two of the above factors were absent.

"In conclusion I am strongly of opinion that insanity is the inevitable result of the use of hemp drugs, whether in excess or in moderation for a prolonged period, and that it is induced earlier in cases of neuropaths and psychopaths. I am also of opinion that the hemp drug is a direct cerebral poison and I put this drug without the slightest hesitation above alcohol, opium and cocaine in their injurious tendencies such as causation of insanity in India."

A number of valuable, but rather abstruse papers were presented at the Section of Medical Entomology. Major J. A. Sinton, V.C., I.M.S. dealt with the classification and identification of members of the genus *Phlebotomus*, and Assistant Surgeon R. O. A. Smith, I.M.S. with their breeding in nature and in the laboratory. Two papers of very great interest, illustrated by very fine microscopic preparations and lantern slides, were those by Mr. M. O. T. Iyengar of the Bengal Public Health Department on the protozoal and nematode parasites of *Anopheles* larvae. The same author also contribute a very well drafted paper on the regional distribution of anophelines in Bengal; he divided the country into montane, sub-montane, upper deltaic, lower deltaic, and coastal zones and showed how the distribution of the 26 different species concerned varies according to the tract of country concerned. Mr Iyengar's four contributions to the Congress were all of them of a very high order of merit, admirably illustrated, and show the splendid and well-organised work which is being done by his department.

In the Section on Bacteriology Dr. C. McGuire, Dr. G. O. Panja, and Dr. K. Bannerjee, all of Colonel

Acton's department at the Calcutta School of Tropical Medicine contributed a series of papers of merit dealing with the commoner tropical skin diseases and the streptococci of the tropics. These covered much the same ground as previous papers in this journal, and need not be discussed in detail; they show how rapidly tropical dermatology is becoming a science, and not a hotch-potch.

It is quite impossible within the limits of this review to give any full account of the tremendous scientific interest of the Congress. In practically every Section the meetings were not merely well attended, but crowded. From the scientific and professional point of view, we believe that the Seventh Congress will be a most memorable one in the history of the Association.

CONCLUDING GENERAL SESSION.

The concluding general session of the Congress was held on Saturday morning, the 10th December, in the Senate Hall of the Calcutta University, with Major-General T. H. Symons, I.M.S., presiding. The Hon. Sir Mohammad Habibulla, Member of the Viceroy's Executive Council, addressed the meeting on India's position in international public health and the medical research work in progress in India. The following is an abstract of his speech from the *Statesman* of the following day.

He said: "I must in the first place, express my regret that I was unable to be present at the inaugural meeting of the Congress, avail myself of my presence in your midst to-day to echo the sentiments expressed in the message of His Excellency the Viceroy, which was conveyed to you by His Excellency Sir Stanley Jackson, and to express the hope that your stay in the second city of the British Empire has been interesting and agreeable.

"That it has been strenuous, I can easily infer from your programme, of which I have seen a copy, and from the summary of your transactions which your energetic Secretary handed to me. To those of you who propose to visit other centres of medical and scientific research in India, I wish a pleasant and instructive tour; to those who must return from Calcutta to their official homes, I wish God-speed. To all of you, whether delegates from abroad or from the various parts of India, I express the thanks of the Government of India for the contribution which you have made by your meetings and discussions to the promotion of medical science, and of friendly understanding between men engaged on a common beneficent task.

"I utter no mere empty platitude of politeness when I say that I have followed your activities with the keenest interest. Though a layman, it is my proud privilege to-day to be in charge of the medical and public health Portfolio of the Government of India. That imposes on me an official obligation to follow, as best I can, the endeavour and achievement of men engaged in the fields of medical administration and research.

But there is also a personal side to my interest. Throughout the active portion of my life, I have been intimately concerned with the administration of medical relief and sanitation. First, as the civic head of the town of my adoption in the Madras Presidency, then as the principal civic executive of the metropolis of that Presidency, and subsequently in succession as a member of the Provincial and Imperial Governments, I have had to concern myself with measures designed to combat disease and alleviate human suffering. This long experience and association have made administration of the subject which is your life's work more than just a dry duty to me.

"I shall not presume to assess the technical value of the work which you have accomplished during your present session in Calcutta. The list of the questions which you have discussed is long; their scientific aspect to a non-scientist like me an esoteric mystery; their analysis or appraisal a task beyond my competence. But after glancing through the summary of your proceedings

and listening to your resolutions, I find that grim diseases, such as plague, cholera, malaria and kala-azar, which from time to time ravage this country, have been claiming your attention.

"I am confident that the light which investigators from abroad attending this Congress have shed on the problems connected with these forms of human affliction, will prove of the utmost value to our own workers. I also trust that an account of our methods, and first-hand experience, however slight, of the procedure, technique and scope of our inquiries in the domain of tropical diseases, will prove of some help to them. For we have, alas! only too many opportunities and ample material for work in this field and I may, in all modesty, but with due regard to their achievement, claim that by our pioneers in medical research, the opportunity has been well and widely used to the benefit of humanity, and the advancement of science.

"The names of Ross, Rogers and Cragg—I must spare those present here to-day the blushes which are the physical reaction of true workers to praise—are not only worthy of my tribute, but are guarantees of the claim which I have made on behalf of the noble band of the servants of medical science in India.

"Nor must I omit mention of that great Indian, whose researches in the field of plant life have opened up fresh and limitless avenues of speculation, of inquiry and of practical achievement to doctors, no less than to biologists. For is not the problem confronting both, one of solving the mystery by which the creative energy that we comprehensively designate life suddenly or slowly freezes into the inertness that is called death? The door leading to such solution may be remote and the master-key yet undiscovered. But I may state with some degree of confidence that among the torch-bearers who have helped to illumine the path, the name of Sir Jagadish Bose will rank high.

"I have spoken so far on the aspect of your work which belongs to the development and diffusion of scientific knowledge. I shall now speak of another aspect of equal importance—the promotion of friendly intercourse between scientific men. To my mind, that is as much as a necessity of the future as its beginning is one of the auspicious and distinctive features of our 20th century civilization. To the Far Eastern Association of Tropical Medicine belongs the credit of first making such intercourse a reality.

"The League of Nations, to whose initiative in the sphere of international co-operation the world owes so much and the Rockefeller Foundation whose truly catholic generosity has rendered immense service to the progress of medical science, have stimulated and accelerated its beneficent development. We in India are willing and ready to play our part in the scheme of co-operation by intercourse. That was one of the motives which led the Government of India to decide to invite the Association to hold its Seventh Session on Indian soil. In the very near future, we hope to hold an interchange of health officers under the auspices of the League in this country.

"Next year we trust the League may find it possible to send their Commission of malarial experts to India.

"I need not remind the Congress that we have been participants in past gatherings of the Far Eastern Association of Tropical Medicine. It must also be known that India is a member of the International Health Office in Paris, and that at present her Public Health Commissioner has a seat on the Health Committee of the League of Nations, and on the Advisory Council of the Bureau of Epidemiology at Singapore. These are a few concrete instances of our desire for co-operation by association and intercourse. If more opportunities for co-operation arise, I am sure India will not be slow to respond to the call of service.

"But I have another motive in dwelling on our readiness for intercourse. There is an impression in some quarters that as a country where certain diseases are endemic, we are doing little to combat them, or to ensure that infection does not spread from our shores to other lands. You have been in Calcutta during an

epidemic of cholera which, for the time of the year, was considered by our experts to be serious. Some of you may have seen what is being done to cope with the outbreak. The fact that it has been rapidly brought under control is proof of the efficiency of the health organisation of this great city. Lt.-Col. Russell, who comes from my old Presidency, has given you some idea of what is being done in Madras. Those of you who undertake any of the tours that have been arranged will get an idea of corresponding activities in other parts of the country.

"I speak of these things not in any spirit of boasting, but to support the claim which I now propose to put forward, that in India we have nothing to hide. It is not suggested that the limit of what is desirable or possible has been reached. In a country greater in size than the whole of Europe without Russia and with a population of over 300,000,000, even a small measure of progress represents endeavour which would be equal to the achievement of perfection elsewhere. I confess that a great deal remains to be done and we need all the light and inspiration that the example of other countries can give us. But we plead not guilty to any suggestion that endeavour has not been quickened by the presence of danger or the breath of science.

"I do not wish you to disperse to-day with the impression that complacent egotism is the keynote of our attitude towards the problems which disease and the effort to prevent and fight disease present. As I have already said, we seek light and inspiration from every quarter. Recently, the Government of India have decided to appoint a committee to inquire into the working of their existing organisation of research and to make recommendations with a view to the establishment of a central institute with whose aid schemes of investigation now in progress in different parts of the country may be co-ordinated, and fresh avenues of inquiry explored.

"Your distinguished colleague, Sir Walter Fletcher, has kindly agreed to preside over the committee. Col. James of the British Ministry of Health who was once with us in India and who has since his retirement from the Indian Medical Service won fresh laurels in other fields, has also, I am glad to say, found it possible to agree to serve on the committee which will include two distinguished workers with recent Indian experience, viz., Dr. Row and Col. Christophers, F. R. S. The Government of India trust that their labours may impart to medical research in India fresh impetus and definiteness of direction.

"I must not detain you too long. You have worked hard and still have a busy round of engagements to go through. It would be inconsiderate of me to weary you with my discourse. I shall offer one word of explanation for the prominence which I have given to research in my remarks. It is because I feel that in the field of medical research, international co-operation can, at this stage, be most fruitful. And gatherings like the Congress provide the right opportunity and atmosphere for exchange of ideas and comparison of methods, for analysis of data and for synthesis of experience.

"Personal relations are established, personal affinities discovered, and misunderstandings of method and objective dispelled. Men separate with greater clarity of vision and strength of purpose to renew their tasks. May the 7th Congress of your Association conclude its labours in the consciousness of much good accomplished and with faith renewed."

On behalf of the foreign delegates Professor Shiga (Japan), Dr. A. L. Hoops (Straits Settlement) and Major Hitchens (U. S. A., and Philippine Islands) thanked the Government of India, the Provincial Governments, the Organizing Committee and others for the success of the Congress.

The following resolutions regarding the control and prevention of malaria, passed by the Malaria Section of the Congress, was confirmed by the meeting.

The Malaria Section of the 7th Congress of the Far Eastern Association of Tropical Medicine are aware of many instances of a great increase in the incidence of

malaria caused by the facilities given to mosquito reproduction by engineering works, either during construction or afterwards due to the different conditions brought about. This Congress is of the opinion that plans for railways, canals, harbours and all similar engineering works likely to affect the conditions producing malaria should be submitted to the proper Public Health Authorities and their Sanitary Engineers before being sanctioned by Governments.

As it has been represented that differences of opinion regarding the best method of controlling malaria sometimes cause doubt in the public mind and so may hamper the progress of anti-malaria work, this Congress takes the present opportunity to emphasize the fact that there is no single method of malaria control applicable to all conditions and all countries.

Nevertheless they consider that for towns, mines, plantations, large public works and similar aggregations of people, the control of the breeding places of the malaria-carrying species of mosquito is a method which should be employed, whatever other anti-malarial measures are put into force. Whenever possible this control should be effected by permanent works which eliminate entirely the sources of mosquito breeding.

For wide rural areas, specially those with scanty, poverty-stricken populations, the first step in the control of malaria is adequate research so that the conditions present may be ascertained and the best methods of control under the particular circumstances ascertained as a result of such research. Methods of prevention may here be of great variety and include drainage, flooding, jungle-clearing, the promotion of agriculture, improvement of housing and the general economic condition, education, etc., of the people. The systematic killing of infected adult mosquitoes, screening, the use of anti-malarial drugs, and a host of special methods have each also to be considered in their proper application.

The Congress desires to stress the need not only of thoroughly trained malaria research officers but of expert malarial engineers in whichever type of malaria prevention is at stake.

The meeting also decided that the Congress should be held triennially instead of biennially.

THE CONGRESS DINNER AT BELVEDERE.

The final function of the week was the Congress dinner at Belvedere, which had been very kindly lent by His Excellency the Viceroy. Over 500 members and guests were present, and we understand that this was the biggest public dinner ever held in Calcutta. The catering was in the hands of Frederico Peliti, and was admirably carried out; whilst the assembly was so large that the dinner was held in the ballroom at Belvedere, the tables covering the entire floor of the ballroom and also the recesses and verandahs. Loud speakers had been installed in different parts of the ballroom, so that the speeches were for the most part clearly audible. Ladies were present, including Her Excellency Lady Jackson, and the scene was a very brilliant one, the mess kit of I. M. S. officers—both new and old styles—and those of foreign delegates from the U. S. Army Medical Corps, of the Portuguese Medical Army Corps, and the French Army Medical Corps—lending colour values to the general scheme. Possibly the pheasant—which had been brought out in cold storage from England or Scotland—was a trifle tasteless, as is so often the case, but the dinner was a great success. We take the liberty of "lifting" the following account of the speeches from the *Englishman* of the 12th Dec. 1927.

In proposing the toast of the "Far Eastern Association of Tropical Medicine," His Excellency the Governor of Bengal said:—

"It is a great pleasure and privilege to propose for your acceptance the toast of the Far Eastern Association of Tropical Medicine. We in India have every reason to give a sincere response to such a toast as this, as there is no country in the world which has more cause to be thankful to scientists for services she has

received in the past, or more cause for hope for further assistance from them which she urgently requires in the future. She has reason to be particularly grateful to many who have assembled here this last week during the meeting of the Congress. There is scarcely any tropical disease known to man, to obtaining control of which they have devoted their professional skill, which does not afflict the people of India. In many countries in the East they have laboured towards the elimination of these scourges with remarkable success, and during the Congress they have willingly and generously given of their fund of knowledge for the benefit of those, who like themselves, are labouring to similar purposes in this country.

The benefits to be derived from the results of such a Congress, when properly applied must be invaluable. I can think of no work more estimable or which in itself should give cause for greater satisfaction than that which aims at the relief of human suffering from tropical diseases.

It has been demonstrated by results obtained in several Eastern countries that it is possible to control and even eliminate some of the worst scourges. It must be to your eternal credit that the only recompense you desire and receive is the gratitude of humanity.

I am glad to hear that your Congress has been a splendid success. This has been due to a large extent to the excellent organisation for which Colonel Cunningham and Colonel Stewart have been responsible, and they will be the first to agree also to the loyal co-operation of every one who attended the Congress.

In welcoming you to Calcutta, I expressed the hope that you would be able to give us useful advice in connection with our grave problems of disease. I understand that my hopes were amply justified and that our medical men have received much help, stimulation and encouragement. We trust that our guests and you may derive satisfaction by knowing that hundreds of medical workers from all parts of India have derived great benefit from the knowledge which has been provided for them.

Every member of the Congress will doubtless become a messenger, who will convey to many others the information, which he has acquired, and in this way the efficiency of the whole medical profession of India will be greatly improved.

I understand there has been some difference of opinion with regard to some of the subjects which have been discussed. This is probably as well, as too great an agreement might create a feeling that further research was unnecessary.

On the other hand it is satisfactory to know that there has been a remarkable degree of unanimity as to the practical measures which are necessary to cope with such diseases as malaria, cholera, plague and kala-azar. While you all agree that more knowledge must be acquired, you also agree that more use must be made of the knowledge which at present exists.

Governments and local bodies will now have confidence in pushing forward measures which have received the approval of distinguished experts from every part of the world.

We in Bengal are glad to learn that the great campaign of inoculation against cholera, which is in progress, is regarded as one of the most effective methods of controlling the disease. It is not the only measure, but when we are attacking an enemy like cholera, we cannot afford to neglect any weapon, which has been proved to be effective.

The problem of kala-azar has been fully and ably discussed at your Congress and I am told that there is a general agreement that the line of research which was opened out by workers at the Calcutta School of Tropical Medicine and the Kala-Azar Commission is regarded as being full of hope. The methods of treatment are already so satisfactory that minor improvements are all that can be looked for.

I was interested to hear that the food supply of the people of India had received very special attention at the Congress. This subject makes a special appeal to

laymen, who not infrequently conduct dietetic experiments on themselves, though perhaps these are not always scientific.

I understand that you have spent some time in considering the ravages of the ubiquitous and iniquitous mosquitoes—those malevolent messengers of malaria. Your unanimous decision on their activities and how to meet them must prove a most acceptable guide to the Health Departments of our Governments. I am hopeful that you will yet teach the mosquito, when it takes its evening meal from me, that the mark of its gratitude it leaves behind would be more acceptable if less pronounced.

In proposing this toast I must not forget the ladies who have accompanied the Congress and who have graced our proceedings and honoured Calcutta by their presence. Their interest and assistance is a great stimulant to those who devote their lives to research in tropical diseases.

I have to couple with great pleasure this toast with the names of Dr. Heiser of the U. S. A. and Dr. Deggeller of Java. Dr. Heiser, as you are aware is a representative of the Rockefeller Foundation in the East and is one of the original members of your Association. Dr. Deggeller of Java is the General Secretary and Treasurer of the Association.

The value of this Congress which you have just completed is unquestionable and with all sincerity and with all gratitude from India I ask you to rise and honour the toast of the Congress of Far Eastern Association of Tropical Medicine."

THE CONGRESS EXHIBITION.

The Congress Exhibition was probably the most interesting one ever held in India. It consisted of two sections; (a) the main scientific exhibition; and (b) the commercial section. The former was unfortunately scattered over several buildings, owing to the diverse nature of the buildings concerned, such as the Calcutta School of Tropical Medicine, the Carmichael Hospital for Tropical Diseases, the Pathological, Anatomical, and Chemical Examiner's departments of the Medical College, Calcutta, and the new Eye Hospital, Calcutta. There were numerous sign posts about, but we believe that but few of the visitors recognised the completeness of the exhibition or studied it as a whole.

Many of the exhibits in the scientific section were of very great interest. Among these we may especially mention the plague exhibit by the Haffkine Laboratory, Bombay; this dealt in detail with the ancient and modern history of plague and antip plague work, and contained many old prints and illustrations. The rabies exhibit by Lieut.-Col. J. Morrison, I.M.S. and Capt. E. C. R. Fox, I.M.D. was of exceptional interest in its graphs of the results of treatment at the different Pasteur institutes of India, and its collection of photographs of unique cases. Colonel Acton's laboratory was transformed into a veritable picture gallery of the commoner and more important tropical skin diseases. Public health work was dealt with in Colonel Stewart's laboratory, including an interesting exhibit of the activated sludge process. Perhaps the finest exhibit of the whole lot was Major Shortt's wonderful exhibit on behalf of the Kala-Azar Commission; this showed an absolutely unique series of splendid microphotographs of the developmental cycle of *Leishmania donovani* in the sandfly *Phlebotomus argentipes*, with an equally fine series of microphotographs of the newly discovered gregarine parasite of *P. argentipes*, *Monocystis mackie*. In the same room the models by Dr. Young of Peking, illustrating the methods of caging an infected and an exposed hamster in a twin cage in order to investigate the rôle of the different biting insects in the transmission of kala-azar was the subject of great interest; as also his extremely ingenious apparatus for artificially feeding sandflies with cultures of *Leishmania* by a capillary pipette apparatus.

In all, the number of exhibitors (counting the Calcutta School of Tropical Medicine as unity) numbered

no less than thirty-one, and the exhibition remained open throughout the week. Lieut.-Col. R. B. S. Sewell, I.M.S. from the Zoological Survey had a splendid exhibit of the poisonous and non-poisonous snakes of India. Dr. Muir dealt fully with leprosy in its every phase. Lieut.-Col. R. Knowles' laboratory was full of protozoal and spirochaetal colour plates. Major Chopra had a very interesting and extensive exhibit of the indigenous drugs and herbal plants of India; Major Boyd one of the commonest poisons used in India. Colonel Megav exhibited museum microscopes, and colour plates in connection with tick typhus, and charts of the geographical incidence of epidemic dropsy. A particularly fine exhibit was one by Major H. H. King of the Guindy Institute on filariasis in lizards, showing the phases of infection in the vertebrate and mosquito hosts, illustrated by wonderful specimens and microphotographs. The Central Research Institute at Kasauli had almost a room to itself, and put up a very fine show, chiefly illustrating malaria in India, and the activities of the Institute in the preparation of T. A. B. and other vaccines. The Indian Red Cross Society had a verandah to itself, and had a very fine collection of lantern slides, propaganda posters, literature, etc.

The special filariasis exhibit by Sir Frank Connor, Colonel Acton, and Dr. Sundar Rao occupied a room to itself, and was a museum of information. Colonel Cunningham's relapsing fever exhibit was of very great merit, especially his wonderful dark ground microphotographs. The radiological exhibit by Capt. Barnard of Madras was a very exceptionally fine one, including a magnificent series of cranial skiagrams taken in conjunction with his enquiry with Lieut.-Col. R. E. Wright, I.M.S. into the causation of optic neuritis and its association with diseases of the accessory sinuses and lesions at the base of the brain. Capt. Barnard has often exhibited at the annual meeting of the Radiological Society in London, and his work in India stands out as pre-eminent.

Colonel McCarrison's exhibits covered a very wide field, illustrating diseases due to dietary deficiencies, goitre, beriberi, and the effects of manganese salts on growth. In the new Eye Hospital, which we fear but few visitors penetrated to, Colonel Coppinger had a simply magnificent series of specimens and coloured plates of ocular diseases and injuries of all types. The veterinary exhibit, which we have previously alluded to, was one of exceptional merit.

The scientific side of the Exhibition, in brief, was so extensive, so well put together, that it might well have taken any member or visitor his whole week in Calcutta to go through it thoroughly. As it is, we fear that most of the members obtained but a partial idea of the vastness of the treasures exhibited.

The commercial section of the Exhibition, we understand, was an extremely successful one. It was held in the Anatomy Department of the Medical College, and the exhibits of new microscopes and microscopical accessories was truly wonderful. Most of the firms which advertise in this journal were represented.

SOCIAL AMENITIES AND OTHER INTERESTS.

The programme for the week was by no means confined to the sectional and general sessions, for every afternoon and evening saw social and other functions connected with the Congress.

On Monday evening, Dec. 5th, H. E. the Governor of Bengal and Lady Jackson held a reception at Government House. This was held in the ballroom, and nearly 1,000 guests were present. Many—perhaps the majority—were in mess kit, and the scene was a very brilliant one. On Tuesday evening Sir Jagadish Chandra Bose, F.R.S. gave a most interesting account of his researches into the mechanism of plant life, plant vitality, and the "heart" of plants at the Bose Institute in Lower Circular Road. This was attended by a very large number of the delegates to the Congress. The action of alkaloids on plant vitality was especially dealt with, and the use of the "resonant recorder" explained.

On Wednesday afternoon the Asiatic Society of Bengal was "At Home" to the foreign and official delegates, and the wonderful and historic collection of treasures which the Society owns, together with its unique historical collection of pictures by Rubens, Raphael, Burne-Jones, and others, was on exhibition. In the evening the Indian Museum was at home. The galleries had all been especially lighted with electric light, and this very famous and wonderful collection can never have been previously viewed to better advantage.

On Wednesday afternoon and Sunday morning special medical films were shown to members of the Congress by Madan's Theatres, Ltd. These comprised extremely interesting cinema records. They dealt with anti-plague measures in Java; with sleeping sickness in Africa; with antenatal and maternity work in India; and with general public health work in this country. A specially interesting film shown was one describing in full the wonderful organisation against cholera in connection with the Kumbh Mela fair in 1927 in the United Provinces. This is a celebrated five-yearly pilgrimage; the risks of cholera are very serious; and the measures taken, which were inspected in 1927 by H. E. the Viceroy, were extremely successful. Another film of special interest shown was one of the cultivation of living tissue by the Carrel method.

The "At Home" of the Calcutta School of Tropical Medicine was held on Monday afternoon, Dec. 5th, and the School was crowded from 4-30 to 7-30, the laboratories all being on exhibition. This ceremony constituted the official opening of the scientific side of the Congress Exhibition, most of which was housed in the School. Another feature of the week was the Garden Party at Government House on the afternoon of Friday, Dec. 9th.

CONCLUSION.

It is quite impossible for any one single reviewer to try and give a full, detailed, and connected narrative of the Congress, though we have attempted to do what we can. The official *Proceedings* of the Congress will probably not be published for another 18 months or so, and even then will only be available to full members, and will not have the world-wide circulation which we should desire.

There can be no question of the great success and international importance of the Congress, or of the dominant position which workers in India, both Indian and European, took in it. Since the Congress terminated there has appeared an attack upon it in the editorial columns of the January 1928 number of our contemporary, the *Calcutta Medical Journal*. We could afford to ignore this, were it not for the fact that the writer emphasizes the supposed fact that the utmost was made of the "very insignificant" part which the Indian Medical Service has played and is playing in medical research work in India, and the grossly official character of the Congress proceedings. The reply to the first charge, we hope, is evident to anyone who was present at the Congress itself. The reply to the second is that an official organisation of some sort is absolutely essential for a huge international Congress of this type, unless the proceedings are to be allowed to degenerate into the proceedings of a bear garden; adherence to a strict time table and very full organisation beforehand are necessary. The writer of this criticism singles out four distinguished Indian scientific workers whose work was "ignored" by the Congress. In doing so, he is singularly unfortunate. The first and second, Sir Jagadish Chandra Bose, F.R.S. and Professor Raman, F.R.S. are not medical men, and therefore could not attend the Congress; on the other hand both gave special evening demonstrations by special invitation to the members and delegates of the very important scientific research work upon which they are engaged. The other two distinguished Indian research workers who are mentioned are Rai Bahadur U. N. Brahmachari and Hon. Lieut.-Col. R. Row, O.B.E.,

I.M.S. Both were distinguished members of the Congress, and both read papers at it.

Our guests at the Congress were guests of the Government of India, and in general of the medical profession in this country. We trust that we have shown them everything fully, that we have kept nothing concealed up our sleeve, that we have done our best both in their interests and in ours. If the Indian Medical Service is in the effete organisation which the writer in the *Calcutta Medical Journal* believes it to be, doubtless we shall learn so from our foreign visitors; the speeches at the Belvedere dinner by the American and other foreign delegates at least do not lead us to believe this to be the case. On the contrary, we believe the Congress to have been truly international, of international importance, and that the work of both Indian and European research workers in India was well represented in it. There is nothing to be gained by misrepresenting the facts. We have no desire at all to enter into controversy; the function of this journal is to reflect the present state and activities of the whole medical profession in India of all classes, status, and creeds. We can but leave it to the future to decide whether India—as a whole—came out well or badly at the Seventh International Congress of the Far Eastern Association of Tropical Medicine.

Current Topics.

Government of Burma (Ministry of Education) Public Health Department.

Resolution; Indigenous System of Medicine.

Extract from the Proceedings of the Government of Burma, Public Health Department, No. 14S28, dated the 14th January, 1928.

THE Local Government has for some time had under consideration the problem of the regulation and improvement of the practice of indigenous methods of medicine in Burma. Proposals with this end in view have been made by the practitioners themselves, and the fear has occasionally been expressed that genuine doctors of the Burmese School are dying out and are being replaced by quacks and persons with the most meagre qualifications or merely the knowledge of a few words of Pali. It is hardly necessary to emphasise the danger of medical practice in rural parts falling into the hands of men who have neither western training nor such skill as a long apprenticeship under a recognized *sesaya* implies. But any attempt to abolish the quack without supplying the medical needs of the people in other ways seems likely to fail. It will be many years before medical training institutions in Burma can place modern scientific treatment within the reach of every villager. The great majority of the people are said to prefer Burmese systems of medicine, and the Hon'ble Minister believes that the problem of extending medical aid demands consideration, whether indigenous methods and practice can be so improved and regulated as to afford some medical relief to people who would otherwise obtain no relief of any kind. For some years courses of training in the rudiments of asepsis and diagnosis have been provided for a limited number of *sesayas* in the hospitals at Mandalay and Bassein. The scheme, limited though it has necessarily been, has met with some success, and the *sesayas* themselves have been keen to learn. The Hon'ble Minister believes that the time has now come for an examination of the problems connected with indigenous medicine and has accordingly decided to appoint a Committee to consider and report on Burmese medicine and the best means of improving and encouraging it, should improvement be found feasible and encouragement advisable.

2. The Committee will be composed as follows:—
 - (1) Lieutenant-Colonel U. Ba Ket, I.M.S., Chairman.
 - (2) Dr. U. Maung Glay, Myochit Dispensary, Yegyaw.
 - (3) Taungtha Saya Hla, Thaton.
 - (4) Saya U. Kywe, Upper Pazundaung (opposite U. Nyo's place).
 - (5) Saya Maung Maung Lat, No. D. 1, Shan Road.
 - (6) Dr. U. Thein Maung.
 - (7) Dr. U. Tha Noo, K.S.M., A.T.M.
 - (8) Saya Nyo, Hinthapadawin, Mandalay.
 - (9) Saya Saing, Upper Oliphant Street, Rangoon.
 - (10) Saya Thin, Municipal Councillor, Ponnazu, Mandalay.
 - (11) U. Shwe Ge, L.M.&S. (Cal.), Hygiene Publicity Office Secretary.
3. The terms of reference will be as follows:—
 - (a) To examine and report on Burmese systems of medicine.
 - (b) To consider whether Burmese systems of medicine can be improved, and if so in what way.
 - (c) To consider whether the training of *sesayas* should be undertaken by Government or left to private agency.
 - (d) If training by Government agency is recommended to consider:—
 - (1) Whether training should be given in Government hospitals or in a separate institution.
 - (2) Whether training should be confined to young men fresh from school, or to practising *sesayas* or should be given to both.
 - (3) What teaching staff would be required.
 - (4) Detailed proposals regarding the length and nature of the courses, numbers of students, and the conditions to be laid down as to educational qualifications, stipends, etc.
 - (5) How textbooks in Burmese could be provided for the use of students.
 - (6) Whether a license should be granted to successful students.
 - (7) Whether Government should prohibit unlicensed practice and if so, after what period.
 - (e) To consider what provision should be made for research into Burmese medicine.

Radium Treatment of Cancer of the Cervix.

By Dr. HELEN CHAMBERS.

Lancet, December 31st, 1927.

THE author reports that there is as yet no general agreement as to the best means of treating cancer of the cervix with radium. Many different methods are in use and they vary in the quantity of radium used, the dosage, and the method of distribution.

The success of radium treatment in cancer of the cervix depends upon the fact that for many months the disease is a local one. It involves a region which is accessible, and one to which a heavy dose of radiation can be safely applied if special precautions are taken.

The most serious objection to radium therapy is that it fails to treat pelvic lymphatic glands. They are only involved, however, in about 37 per cent. of these cases at the time of death, and as the majority of patients are first seen a year or 18 months earlier, it is reasonable to suppose that the greater number of patients when first seen have no gland involvement at all. This is supported by the fact that many cases are alive and well ten years after radium treatment.

It is essential to use multiple sources of radiation at the site of the growth, and Dr. Chambers describes a method by which the whole of the tissues involved can be acted on by the applications.

A similar method has been used in Japan (Ikeda) since 1914; the results are some of the best on record. This method has only been used in England since 1925 at two London clinics, and it is not in use at the present time anywhere else in that country. The

largest number of cases treated by this method and recorded in British literature have been treated under the auspices of the Cancer Research Committee of the London Association of the Medical Women's Federation. They report 117 cases with no death directly due to the treatment. Fifty per cent. of their cases treated more than a year ago are stated to be free from signs and symptoms of cancer; the percentage operability of these cases was not more than 15 per cent. These results are too recent to justify conclusions as to the ultimate value of the method, but as far as they go they agree with the foreign reports and compare very favourably with the results at those clinics which report 70 per cent. of cases as having died within a year of the patients first being seen. Hospitals are entirely without the facilities for providing it. With extended knowledge it is to be hoped that this state of affairs will very soon be rectified.

An Operation for the Alleviation of Deafness.

By VINCENT NESFIELD, F.R.C.S. (Eng.),
MAJOR, I.M.S. (Retired);

Ophthalmic Surgeon, Queen's Hospital
for Children.

Lancet, December 24th, 1927, p. 1338.

THE following abstract from the *Lancet* of December 24th, 1927, will interest our readers.

"In 1919, while serving in the Indian Medical Service and acting as surgical specialist of the Mhow Division, I was approached by many people suffering from deafness, and was unable to help them.

One day I found in the cantonment hospital in Jubbulpore a fine old Sikh of 65 or more lying on the operating-table; he refused to move until I had operated on him, as this was his lucky day. About a month previously I had extracted both his cataracts, and he could see perfectly, so he believed that the cure of his deafness was an easy matter. I had many times refused to operate, explaining that the eye was on the surface, and the organ of hearing hidden at the bottom of a long narrow canal embedded in the skull. It was these discussions that finally suggested to my mind the operation here described.

He was very importunate and had indeed taken an oath of starvation unless I operated, and so I asked the assistant to give him chloroform and operated on both ears. The man made an excellent recovery, and went home both seeing and hearing. This brought me such a stream of similar sufferers that I did not know how to cope with them.

The fundamental idea of the operation is simple. When deafness is due to obstruction of the Eustachian tube the treatment is to make a new passage leading from the exterior into the cavity of the middle ear behind the ear-drum.

The Operation.

The skin behind the ear is painted with tincture of iodine and a light general anæsthetic given, preferably chloroform, which ensures less bleeding. $\frac{1}{2}$ per cent. phenolaine (a local anæsthetic) is injected subcutaneously, and an incision is made close behind the pinna. When the periosteum is reached phenolaine is injected under it and also between the cartilaginous canal and the bony meatus. The periosteum is incised and separated from the bone with a raspator, all redundant periosteum being cut away. McEwen's triangle is located, and a retractor inserted, so as to pull the pinna forward. All the vessels on the posterior flap are clamped, while those on the anterior are compressed by a small wad of cotton-wool under the retractor.

A hole is then bored over McEwen's triangle with a hand gouge 11 mm. in diameter. The boring is continued in a direction which cannot be previously defined, as it must follow the line of least resistance, skirting in front of the lateral sinus. There is a thin dense wall of bone lining the sinus, which can always be seen as a dark blue mark. Finally, depending upon

the anatomy of each case (and all are different), an occasional cell is reached about 10 mm. from the surface; though less frequently there are cells 2 mm. from the surface. The 11 mm. gouge is used till a thinness is noticed at the bottom of the boring. A 7 mm. gouge is now used, and the boring, or rather filing or scraping process, is continued until the thin wall of the antrum, or attic of the middle ear, is reached and gently scraped away. The first opening to appear is probed to discover whether it is only a cell or a larger cavity leading into the middle ear; the excavation is continued till a definite opening of about 5 mm. diameter is produced. A strong probe with a short right-angle bend is inserted and the thin wall between the antrum or middle ear (as the case may be) and the boring is broken away by pulling outwards. A fine probe, bent at an angle of 45° at the tip, is carefully passed at the bottom of the boring towards the middle line to ascertain if the attic of the middle ear has been entered. Great care is taken not to disturb the processus gracilis of the malleus. The total depth from the surface of the skull to the bottom of the attic is 22 mm.

The posterior portion of the cartilaginous canal is now separated from the osseous canal, and the ridge of bone between this canal and the boring is scraped away with the 11 mm. gouge for about 5 mm. The cartilaginous canal is divided transversely at the level of the ridge and two longitudinal incisions are made so as to reflect a flap of the canal outwards. A broad director is inserted through the external auditory meatus under the flap, and the incisions are continued, till the external auditory meatus will admit the tip of the little finger.

The flap is now sewn with catgut to the under surface of the reflected skin, so as to keep the widened meatus patent, and stop bleeding.

Two suitable rubber tubes are now inserted from the external meatus to the bottom of the boring.

The incision at the back of the ear is closed with horse-hair, a small opening being left at the bottom for drainage. The ear is smeared with carbolic (1 per cent.) vaseline and a dressing applied behind it.

A hammer is never used as the bone is extraordinarily variable in density. In old-standing cases it is ivory-hard and there are no cells, while the lateral sinus forms a bend towards the external auditory canal. The facial nerve runs no risk, while the lateral sinus can always be seen. The dura mater is occasionally seen when the bone is very dense; this is when the cranial cavity comes lower down than usual, to fill the space normally occupied by the mastoid cells.

After-treatment.

The tubes are syringed out and one is removed on the first day; on the second day the remaining tube is removed and the cavity plugged with narrow ribbon gauze. The gauze is removed twice a day and the cavity syringed out either with 1 in 4000 perchloride of mercury or with biniodide, or with a weak solution of hydrogen peroxide, or hypochlorite.

By the end of a week the cavity discharges a good deal of mucus. The orifice is kept patent with gauze plugging, which is renewed once or twice a day for three weeks. On each occasion that the plugging is removed the cavity is syringed out with a weak antiseptic. Special care should be taken to inspect the bottom of the boring with an auroscope, so as to keep the foramen open which enters the middle ear; this is about 18 mm. from the surface. By the end of the third or fourth week mucous membrane lines the boring and joins with the skin of the external auditory canal. After a month or so the patency of the external opening is maintained by using a large lacrimal probe. The patient usually goes home at the end of the third or fourth week. A thin membrane, almost like tissue paper, often forms across the opening after some weeks and may require to be pierced every now and then if the hearing diminishes.

The result of the operation is to produce a new air passage to the middle ear. This incidentally opens

the Eustachian tube, as the middle ear is now no longer a closed cavity, and so the patient can easily blow air through the Eustachian tube via the middle ear and out by the extreme auditory meatus. The middle ear is also drained, and the mucous membrane rendered healthy.

Results.

I have operated on more than 200 cases, from the ages of 4 to 70 years. The results have been variable, depending upon the period of the deafness. The improvement in the hearing of many patients who have been deaf for 30 years has been astonishing, and no case has ever been worse after the operation. In many the deafness has been arrested, while in the great majority the hearing has been greatly improved.

An Operation for the Alleviation of Deafness.

Lancet, December 31st, 1927, p. 1417.

The following letter appears in the *Lancet*:—

SIR,—Major Vincent Nesfield's article on this subject (*THE LANCET*, Dec. 24th, p. 1338) is most interesting to me. Had he been an aural, and not an ophthalmic, surgeon he might have known of the mastoid operation I introduced in 1906—of which thousands have been performed—on practically the same lines as the operation he now outlines. My operation, also, was outlined in your issue of August 11th, 1906; the ten cases there described (all that had then been performed) were exhibited by me at a meeting of the British Laryngological, Rhinological, and Otolological Association (the Royal Society of Medicine was not then in existence). Their perforated drums had healed and their hearing was so good (some absolutely perfect) that I received unanimous congratulations. The report of this meeting was published in your issue of Dec. 15th, 1906.

The great ear hospital at The Downs, Sutton, has, at this moment, 150 operations of this kind now in the wards. I was operating there two evenings ago. I hope when Major Nesfield exhibits his cases—as, of course, he will—that the results will justify his audience in also giving congratulations, for there are too many deaf people in this country.

I am, Sir, yours faithfully,

CHARLES J. HEATH, F.R.C.S. (Eng.),

Consulting Aural Surgeon, The Downs Hospital; late Surgeon, Throat Hospital, Golden-square, W.

Dec. 26th, 1927.

Reviews.

RECENT ADVANCES IN TROPICAL MEDICINE.—

By Sir Leonard Rogers, C.I.E., M.D., F.R.S.
London: J. & A. Churchill, 1928. Pp. 400, with 12 illustrations. Price, 12s. 6d. net.

If Sir Leonard Rogers had merely given an account of his own contributions to tropical medicine they would be well worth putting together in a volume like this, but we are further indebted to him for having included an admirable account of the work of many other investigators.

Sir Leonard has written the excellent articles on tropical diseases which have appeared for the past few years in the *Medical Annual*, and now he has brought together the substance of these articles and added to them in such a way as to produce a book which will be greatly valued by all students of exotic diseases.

In the 400 pages of this handy volume the student will find exactly what he wants to know of the recent advances in tropical diseases; there is no padding, no inclusion of unnecessary details, and no omission of anything that is important. The whole of the literature has been studied and summarized by an expert

who is thoroughly competent to separate the wheat from the chaff. There is no need to advise the worker in the tropics to buy the book, he simply must have it, but we appeal to the small army of writers of text-books of general medicine to make themselves familiar with its contents and so avoid the common mistake of giving misleading and obsolete accounts of diseases of which they have no personal experience. Although Sir Leonard might justly ignore much of the work which has been done by lesser men, he has been exceedingly generous in doing justice to their contributions. He writes in the manner of a critic, but he is a generous and friendly critic who gives the fullest consideration to views which must in some cases be different from his own.

A strict sense of proportion is maintained throughout the book, and special prominence is given to the important diseases, their diagnosis and treatment.

The book will be read with great pleasure and profit by every medical man who wishes to handle his cases of tropical diseases with efficiency: it will also be essential for constant reference regarding the doubts and difficulties which arise in everyday practice.

The book has been produced in an excellent manner by the publishers, who are to be congratulated on having persuaded Sir Leonard to place his unique knowledge at the disposal of the medical men who have to deal with cases of tropical disease.

J. W. D. M.

MEDICINE MONOGRAPHS, VOL. X. "THE SIGNIFICANCE OF THE PHYSICAL CONSTITUTION IN MENTAL DISEASE."—By F. I. Werthelmer and Florence E. Hesketh. London: Baillière, Tindall & Cox, 1926. Pp. xlv plus 87, with 30 plates. Price, 11s. 6d. net.

THIS latest addition to the series of *Medical Monographs* traces the development of the conception of body types and their relation to mental function and mental disease. The aim of the authors is to give a concise critical analysis of the various anthropological methods, particularly those which relate to medicine and psychiatry, and in addition to present a new anthropometric index. Current conceptions of personality are evaluated and discussed from a new point of view. The authors present a study of a series of patients with reference to body type and make an attempt to correlate psychoses and personalities according to their index and classification of body types. Dr. Lewellys Barker has contributed a preface in which he discusses the study as an addition to our knowledge of the "biology of the person," recommending it warmly to all students of internal medicine and psychiatry. The volume is illustrated with twenty figures in the text and five plates. It has a working bibliography of ninety-five references and a full index. The book should prove useful to anthropologists, psychiatrists, and to the ever increasing body of practitioners of medicine who are becoming more and more interested in the relationship of constitution to disease, a subject which is in the forefront of medicine to-day.

O. B.-H.

AFFECTIONS OF THE STOMACH.—By Burrill B. Crohn, M.D. London and Philadelphia: W. B. Saunders Company, Ltd., 1927. Pp. 902, with 361 illustrations, some in colours. Price, 45s. net. Agents in India: Messrs. Thacker, Spink & Co., Calcutta.

THIS book is a monograph on diseases of the stomach: it deals with the subject from the point of view of laboratory examination as well as from that of the clinician. It is essentially a book for the specialist or for reference for the general practitioner. One of the most valuable chapters is on the radiography of the stomach, by the author in collaboration with Dr. S. J. Goldpart; others which are of special importance are those dealing with gastro-duodenal ulcers, in which will be found a critical analysis of the results which are obtained by medical and surgical treatment respectively. It must be admitted that the

practitioner will not derive great comfort from these chapters. Dr. A. A. Berg tells us that the only operation which brings about a permanent cure is sub-total gastrectomy, a procedure which will be undertaken by few surgeons in India in spite of the author's claim to a mortality of less than 5 per cent. in 400 cases. Medical treatment is said to bring about a cure in about 50 per cent. of cases provided that prolonged and careful treatment is adopted. As a whole the book is one of very great value, but it is by no means a beginner's text-book; it deals with the whole subject in a spirit of scientific caution, and consequently there is a complete absence of the simple dogmatism which appeals so strongly to the student as well as to the average practitioner. The illustrations are very good, and the price reasonable.

CHOLERA CHIKITSA (IN BENGALI).—By Arun Kumar Mukherjee, M.B. (Cal.). Second Edition. Published by B. C. Bhattacharyya, 23-B, Bethune Row, Calcutta, 1928. Pp. 108. Illustrated. Price, Re. 1-8.

THE second edition of this little illustrated booklet on cholera by Dr. Arun Kumar Mukherjee is to be highly recommended to doctors who are not very familiar with English, or who are more at home in the Bengali language. The book is a highly practical one and is written in a simple, clear style by one who has had abundant experience in dealing with the disease. The diagnosis and prevention of cholera are fully dealt with, and its treatment along the lines advocated by Sir Leonard Rogers is very lucidly explained. This little book will be very acceptable in the villages of Bengal where epidemics of cholera are so frequent.

E. M.

THE TREATMENT OF FRACTURES—WITH NOTES UPON A FEW COMMON DISLOCATIONS.—By Charles Locke Scudder, A.B., Ph.D., F.A.C.S. Tenth Edition, Revised. Philadelphia and London: W. B. Saunders Company, Ltd., 1926. Pp. 1240, with 2,027 illustrations. Price, 55s. net.

THE tenth edition of this well-known text-book contains a revision of the subject matter, with enlargement of some of the chapters.

Special aspects of the subject, such as pathological fractures, birth fractures, fractures of the maxilla and mandible, bone repair and massage, are dealt with by separate contributors.

The much-discussed subject as to the place occupied by open operation in the treatment of fractures is very fairly dealt with. The experience of the Great War proved, and subsequent work has confirmed, that traction methods can produce ideal anatomical apposition, with good functional results. It is not necessary to employ various assortments of hardware as internal fixation devices have been termed for the great majority of ordinary closed fractures.

It is inevitable that there should be certain fractures and conditions of fractures for which open operation is advisable. The author insists that proper experience is necessary in the choosing of these, and great technical skill is needed for their performance. The indications are clearly outlined. Sir Berkeley Moynihan's words, as quoted in the preface, that 'surgery to-day is being practised by too many light-hearted, and incompetent surgeons,' are becoming less applicable to ordinary surgery. But they may well be remembered in the case of open operations for the treatment of fractures.

About fifty pages only are employed in discussing some of the important dislocations.

Great stress is advisedly laid on the use of the simplest methods and apparatus for each case. We are also reminded that there is often no high road to success, and that alternative procedures may prove equally effective.

Scudder's *Treatment of Fractures* is now a well-established book, and needs no further reference here. It is a mine of information.

THE PRINCIPLES OF SURGICAL DRESSING.—By Lieut.-Col. R. C. McWatters, M.B., F.R.C.S. Calcutta and Simla: Thacker, Spink and Company, 1928. Pp. vi plus 110. Price, Rs. 3-8.

THE object of this small volume, as explained in the preface, is to gather together under one cover the important points in connection with surgical dressing—points very frequently dealt with in a somewhat casual fashion by the ordinary text-book of surgery. Let it be said that the author has on the whole succeeded admirably in his task. The subject matter is dealt with in clear, concise and logical fashion and case histories are given in several places to illustrate various points as they arise. There is a grateful absence of controversial topics and of errors we detected relatively few. We think, however, that the author's recommendation to irrigate the ear in otorrhœa with an ear syringe and boracic lotion (p. 74) will not meet with universal approval. On p. 77 the strength of physiological salt solution is given as 0.65 per cent. instead of 0.85 per cent.: this, however, is probably due to one of the printing errors from which the book is not entirely free despite its small size. To the student about to commence clinical surgery and also to the junior dresser Col. McWatters' little volume should prove of considerable service.

J. M. H.

CYSTOSCOPY.—By J. B. Macalpine, F.R.C.S. (Eng.). Bristol: John Wright and Sons, Ltd., 1927. Pp. 284, with 181 illustrations and 12 coloured plates. Price, 25s. net.

THERE has long been scope for a small hand-book on cystoscopy in English on the lines of Marion and Heitz Boyer's classical work in French. The present book appears to fill the gap admirably, it is not too lengthy, it deals with the subject from the practical aspect, the author has a wealth of experience to draw upon and as a teacher is able to appreciate the difficulties of the beginner. In the opening chapters the structure of the cystoscope is described in detail and the optical principles are lucidly explained and illustrated, dry matter but essential to be mastered if the cystoscopist is to get the best out of his instrument. The sections on how to track down faults should be carefully studied, as also the admirable scheme of examination laid down in Chapter III. Following the French School the author has a preference for sacral anæsthesia, a method which has not yet become very popular in England. The directions for dealing with irritable bladders, the figures showing how an incorrect position of the patient may introduce unnecessary difficulties, especially figure 51 showing various causes for failure to see anything in the bladder, and the description of the manipulation of the instrument during the actual examination so that nothing may be missed through lack of system, are all very practical and should be most useful to the beginner. The chapters on the various pathological conditions are on much the same lines as the corresponding chapters in Marion and Heitz Boyer, to which work the author pays due acknowledgment. It is difficult where all is so good to single out sections for special praise, but we consider that the chapters dealing with ureteric catheterization, with the treatment of stones impacted in the lower ureter and with renal function tests are the clearest exposition of these subjects we have ever read. The simple scheme for estimation of kidney function which the author advocates is the one we have always considered the most suitable for conditions in this country, where expensive colorimeters are not numerous, and where tests which give an immediate answer are always to be preferred to those needing the intervention of a laboratory. The chapter on pyelography is very clear and is illustrated by numerous reproductions of typical pyelograms.

The illustrations, thanks to Mr. Thornton Shiells' well known skill, are beautifully drawn and coloured and give a realistic picture of the actual appearances.

As a whole the book merits unstinted praise; it is written in a pleasant style easy to read, it gives

all the information necessary to anyone except a specialist and it should take its place as the standard text-book. Most general surgeons have to use the cystoscope occasionally and sometimes run up against difficulties which render the examination valueless; such will not happen to those who have mastered the contents of this book.

W. L. H.

Annual Reports.

THIRD ANNUAL REPORT OF THE PASTEUR INSTITUTE, CALCUTTA, FOR THE YEAR 1926. BY CAPT. E. C. R. FOX, I. M. D., CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT. 1927. PRICE RE. 1.

THE Pasteur Institute, Calcutta, was opened in 1924 in response to the incessant demand of the populace of Calcutta and Bengal for a local, provincial antirabic centre situated within the Province and more readily accessible than Shillong. It forms a section of the Calcutta School of Tropical Medicine, and is under the control of Capt. E. C. R. Fox, I.M.D., an officer with a life-long experience of antirabic work at Kasauli—where he was associated with Sir David Semple in the early days of antirabic work in India, Shillong, and Bombay. The amazing growth of this Institute can be judged from the following figures for patients treated:—

1924 (seven months)	.. 1,462
1925	.. 4,168
1926	.. 5,141

Further, it is certain that the last figure would have been much larger, had it not been for the communal riots in Calcutta in April and May 1926, when the number of patients under treatment showed a rapid falling off in numbers. Despite these figures, Capt. Fox states that further increase in numbers is all too likely. The number of advice cases during the year was 1,432; the majority of these came from Calcutta, and the advice given saved them what would have meant a journey to Shillong had not expert advice been available on the spot in Calcutta. Thus the Institute has already much more than justified its existence.

The final figures dealt with in the statistical tables concern the 5,141 patients who completed treatment, and it is encouraging to note that from 80 to 85 per cent. of answers were received by the method of the follow-up postcard system. The total hydrophobia rate was 0.84 per cent. (43 cases), and this represents a quite appreciable lowering of incidence when compared with the general figures at Kasauli and elsewhere for many years,—probably owing to the very ready accessibility of Calcutta, and the early arrival of most patients. The failure rate was only 0.45 per cent. (23 cases).

Very interesting figures are given to show the entirely different degrees of risk among the European and Indian patients respectively. Thus the percentage of licks was 52 per cent. among the Europeans, as compared with 1 per cent. among the Indian patients; the average number of bites was 1.2 among the Europeans, as compared with 3.6 among the Indians; and only 23 per cent. of European patients had deep bites, as compared with 65 per cent. among the Indians. Eighty-eight per cent. of the European patients arrived with 24 hours of being bitten, as compared with 62 per cent. of the Indian patients: the latter figure, however, is an extremely good one for an Indian institute, and again emphasises the ready accessibility of the Calcutta institute; it is a very different figure from what used to obtain in the early days of the Kasauli institute.

The other tables in the report follow on the usual statistical lines. The hydrophobia rate for bites on the face, head, and neck was 6.32 per cent. among Indians,

as compared with the general rate of 0.88 per cent. Nearly 2,000 of the patients came from Bihar and Orissa, but that Province—we understand—is about to open an institute of its own, after having profited by the Calcutta experience. Jackal bites are prominent in the Calcutta (as in the Shillong) figures—a state of affairs quite different from what obtains in Burma and Coonoor. The hydrophobia rate in cases of jackal bite—1.5 per cent.—is nearly three times as high as in cases of dog bite—0.6 per cent. One patient who developed hydrophobia had been bitten by a rabid cat.

During the year, the work was carried on under most uncomfortable and very crowded conditions in a single laboratory on the fourth storey of the Calcutta School of Tropical Medicine; indeed the endless procession of the patients concerned up the main staircase of that institution every morning was a sight almost worthy of the Puri pilgrimage. Since then remodelling of the institution has been brought in, and the Pasteur Institute is now housed on the ground floor in better—but still inadequate—accommodation. The outside issue of antirabic vaccine was under consideration during the year, but in view of the expected report by the International Rabies Conference in Paris on this subject, and of the experimental work which is at present being carried out at the Pasteur Institute of India, Kasauli, on etherised vaccine, this question has been held in abeyance. The etherised vaccine is reported to be more efficacious than the present carbolic one, but has to be administered whilst fresh; a practice which would lead to reversion to the custom of treating all patients at a central antirabic station, instead of the outside issue of the vaccine to head-quarter hospitals, as now practised in some provinces in India.

Capt. Fox and his staff are to be congratulated on a year of steady work and progress, under most difficult conditions and with very inadequate accommodation.

KING EDWARD VII MEMORIAL PASTEUR INSTITUTE, SHILLONG. TENTH ANNUAL REPORT FOR THE YEAR 1926, BY MILITARY ASSISTANT SURGEON A. C. VARDON, I.M.D., SHILLONG. GOVERNMENT PRESS, ASSAM. PRICE RE. 0-12-0.

THIS report follows on the main statistical lines adopted by all the Indian institutes since its first introduction many years ago at the Kasauli institute by Lieut.-Col. W. F. Harvey, I.M.S. (retd.). The total number of patients treated during the year was 1,417—a definite increase on the figures for 1925. The total hydrophobia rate was 0.99 per cent. (14 deaths), and the failure rate 0.42 per cent. (6 deaths). Lick cases amounted to 77 per cent. among the European patients, as compared with 4.4 per cent. among the Indian patients. The vast majority of the patients—94.3 per cent.—came from Assam, whereas Bengal and Bihar and Orissa only contributed a few scattered cases. Jackal bites—always a prominent feature in the Shillong figures—accounted for no less than 12.3 per cent. of admissions, and yielded a hydrophobia rate of 5.2 per cent. as compared with a corresponding hydrophobia rate of 0.41 per cent. for patients bitten by dogs. Half the fatal cases occurred in persons bitten on the face.

A departure during the year was the issue of antirabic vaccine to veterinary and medical officers for the treatment of bitten animals in the Province. This brought in a sum of Rs. 500 to the Government revenues.

Turning to the bacteriological and research section, the routine tests carried out totalled 2,948. The kala-azar hospital attached to the Institute continued to carry out excellent work. A special feature of this work was the high proportion of non-kala-azar cases sent up for diagnosis as suspected kala-azar; of 167 suspected kala-azar cases admitted, only 56 turned out to be cases of that disease. In this respect there is

an immense difference between the reports of this Institute for 1917 and 1926. In the former year, when the hospital was first opened, kala-azar patients from the tea gardens had to be bribed to come to the Institute for treatment; in 1926 the majority of patients were resistant cases of kala-azar or cases presenting special difficulty in diagnosis, sent up for expert laboratory examination. The general populace in Assam is now not merely accustomed to intravenous injections for kala-azar; patients throughout the Province now demand the treatment, which is available at almost innumerable local centres near their homes; in place of typical, untreated cases of the disease, it is now the failures of treatment—or the patients suffering from diseases other than kala-azar, which seek the hospital at the Institute for treatment. Amongst such cases infection with intestinal helminths forms an important element in the clinical picture.

Lieut.-Col. F. C. Hodgson, N.S.O., I.M.S., was in charge during the year (except when absent on leave), but as he was transferred early in 1927 the present report is by Mr. A. C. Vardon, I.M.D., who took over charge from Colonel Hodgson, on the latter's transfer.

Correspondence.

THE MOFUSSIL DISPENSARY.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Your interesting editorial in the December, 1927, number of the *Gazette*, on the *mofassil* dispensary, and your excellent suggestion of mobile motor medical attendance, or in the alternative of subsidy to private practitioners in preference to the badly equipped, poorly staffed *mofassil* dispensary of the present day, deserves the closest attention of all who have the good of the country at heart. A little consideration ought to show that in medical service mere quantity is no good; it is dangerous; the quality of service is what matters. I speak from personal experience as I come from a place situated far from any railway station, in what is generally regarded as the most insanitary subdivision in Bengal (Arambagh in Hoogli).

Your correspondent, Dr. Bhattacharyya, is wholly wrong when he says that "the illiteracy of the masses rather than the incapacity of the doctors concerned is the chief obstacle to the progress of modern scientific medicine." To do the Bengali peasant justice, he is always quick-witted enough when he finds a real remedy for his complaints. For example thirty years ago the treatment adopted for rabies was incantations, and occasionally a few secret reputedly potent remedies; we could not blame the peasant for it, as at that time scientific medicine held out little hopes of prevention or cure for rabies. As soon as Pasteur's treatment became known however and its effects recognised, these methods began to fall into disrepute and people began to take to the new treatment in right earnest. The only deterrent was the remoteness of the treatment centre, situated as it was at Kasauli, 1,100 miles away. The opening of a rabies treatment centre at the Calcutta School of Tropical Medicine has resulted in a much larger number of patients getting the treatment who would otherwise have been unable to avail themselves of it, and if more centres for the treatment of dog bite were opened in district headquarters, as they ought to be, there would be no dearth of patients or attendance.

Cholera furnishes another example of how success in treatment can win over even village people to the most complicated and difficult methods of treatment. Twenty-five years ago on our own showing our treatment of cholera resulted in 70 per cent. of deaths, and it was the exception for a villager to take allopathic treatment when attacked with cholera. Now it is the exception to do otherwise. The expenses incurred in

getting the most up-to-date treatment for cholera with repeated intravenous injections and rectal injections are however too much for the poorer agriculturists. It is mostly on this score and owing to the want of properly qualified medical officers willing and able to carry out proper treatment, and also to the absence of a specific cure, which is largely responsible for the people still occasionally taking to other methods of treatment.

Lastly kala-azar furnishes a brilliant example of how a complicated method of treatment, often painful, always tedious, and generally expensive, can completely win over the so-called ignorant villagers in less than a decade. How can we blame them, if in the pre-antimony days, when the mortality figures stood at somewhere about 90 per cent. they would fight shy of our system. Now that the death rate is only 10 per cent. there is no dearth of patients at the kala-azar centres and District Boards are vying with one another in issuing free supplies of the newer antimony preparations.

I have purposely selected rabies, cholera, and kala-azar for illustration—three diseases in which the course of treatment is one long series of injections. It has been especially in these three that modern medicine has achieved an unusual degree of success in India. I cannot help quoting here the experience of a friend and colleague of mine, a young Bengali Mahomedan graduate who started practising in his native village in the 24-Perganas district, an out of the way place with mostly poor cultivators in the neighbourhood. He says as soon as his first kala-azar case became cured and the first dysentery case improved with emetine, men began to talk about it in the bazar and in six months' time his house continually resembled a *melu* full of the sick and the infirm, their friends and relatives of all the villages for miles around. Unfortunately for the villagers, the doctor had to leave the village as he and all the members of his family were repeatedly attacked with malarial fever.

It is only in the diseases in which we do not claim a cure such as nervous affections, paraplegia, hemiplegia, chronic rheumatic trouble, cirrhosis of the liver, mental diseases, etc., that the villagers will try other systems of treatment, or as a last resort faith healing.

Indeed instead of the cultivator resenting injections, how often have we not seen a villager coming to us and requesting us not to use our drugs but our 'injunctions' (1) as he often chooses to pronounce it?

The remedy, therefore, lies in improving our own methods and improving the quality of service. As I say, it is not the ignorance of the villagers or their superstition but the inefficiency of our medical service, starved of training and of funds which forms the principal drawback to progress in therapeutics in the *mofussil*. What is wanted is money and even more than money, a policy, a co-ordinated comprehensive policy for the province and possibly for India as a whole.—Yours, etc.,

SANAT KUMAR GUPTA, M.B.

124/4, MANIKTALA STREET.

Calcutta, 12th January, 1928.

THE CHEMISTRY OF THE BLOOD OF NORMAL HEALTHY INDIANS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the July, 1927, issue of the *Gazette* there is an interesting paper by Dr. J. P. Bose on the chemistry of the blood of Indians. In his article Dr. Bose does not make any reference to my previous work on the same subject. Perhaps he is unaware of the work I have been carrying on for the last four years, though in view of the fact that most of my papers were published in the *Calcutta Medical Journal* (March and September, 1923; May and October, 1925), it seems improbable.

Dr. Bose's findings are more or less similar to mine. His figure for the normal uric acid content of the blood is, however, rather lower than my findings, though he has not mentioned what method he employed. Benedict's recent method generally gives higher results than Folin's older method. Using both methods it was found that the uric acid content of the blood of healthy Bengalees is higher than the corresponding normal figures for Europeans.

My findings are given below, the subjects being healthy young male students:—

	Maximum.	Minimum.	Average.
1. Non-protein nitrogen	35.0 mgm. per 100 cc. of blood.	22.0 mgm. Per 100 cc. of blood.	27.4 mgm. per 100 cc. of blood.
2. Urea nitrogen	15.0 mgrs. "	8.4 mgm. "	11.2 mgm. "
3. Uric acid { (a) by Benedict's new method .. 5.6 mgm. "	5.6 mgm. "	3.6 mgm. "	4.6 mgm. "
(b) by Folin's old method. .. 4.0 mgm. "	4.0 mgm. "	2.2 mgm. "	2.9 mgm. "
4. Cholesterol	160 mgm. "	124 mgm. "	140 mgm. "
5. Calcium	10.2 mgm. Per 100 cc. of serum.	9.2 mgm. per 100 cc. of serum.	9.6 mgm. per 100 cc. of serum
6. Creatinine	1.46 mgm. per 100 cc. of blood.	0.8 mgm. per 100 cc. of blood.	1.08 mgm. per 100 cc. of blood.
7. Blood-sugar	120 mgm. "	50 mgm. "	99 mgm. "
8. Inorganic phosphate	3.58 mgm. Per 100 cc. of plasma.	2.36 mgm. per 100 cc. of plasma.	3.0 mgm. per " 100 cc. of plasma.
9. RPH (blood)	8.65	8.45	8.5

THE INCUBATION PERIOD OF MEASLES.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I would like to draw the attention of your readers to the period of isolation for measles, which has been the subject of correspondence in recent issues of the *British Medical Journal*.

When such high authorities as Dr. W. E. Goodall and Dr. J. D. Rolleston agree that it is perfectly safe for an uncomplicated case of measles to mix in society fourteen days after the first appearance of the rash, there should be no matter for doubt.

10. Sedimentation Velocity average (male)—7.6 mm. per hour during first hour; (column of blood 100 mm. long, calibre of tube—11 mm.; 4 volumes of blood mixed with 1 vol. of 3.8 per cent. sodium citrate solution).

11. Basal metabolic rate average—9 per cent. (compared to European standards).—Yours, etc.,

H. N. MUKHERJEE, B.Sc., M.B., D.L.C. (London).

BIOCHEMICAL DEPARTMENT,

CARMICHAEL MEDICAL COLLEGE,

1, BELGACHIA ROAD,

Calcutta, January 18th, 1928.

In an outbreak of 100 cases of measles in this school in 1926, the uncomplicated cases were discharged back to School from Hospital after a fortnight, and I was not able to trace fresh infections to such action.

In consequence, we were able to deal with this epidemic without undue strain on our limited isolation accommodation and nursing staff.

The number of school hours not lost is apparent, and the advantage of not having an accumulation of virile children to diet and amuse for an extra week, can only be appreciated by those who have to do it.—Yours, etc.,

P. SAVAGE,

MAJOR, I.M.S.,

Resident Medical Officer.

THE LAWRENCE ROYAL MILITARY SCHOOL,
SANAWAR, SIMLA HILLS,
13th February, 1928.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel R. W. Anthony, M.B., C.M., F.R.C.S.E., I.M.S., Officiating Surgeon-General with the Government of Bombay, is confirmed in that appointment, with effect from the 10th January, 1928.

Lieutenant-Colonel F. E. Wilson, I.M.S., Civil Surgeon, Quetta, is appointed to Officiate as Residency Surgeon and Chief Medical Officer in Baluchistan, in addition to his own duties, with effect from the 1st January, 1928.

Lieutenant-Colonel J. Husband, I.M.S., an Agency Surgeon, on return from leave is posted as Legation Surgeon, Nepal and ex-officio Assistant to the British Envoy at the Court of Nepal, with effect from the 24th January, 1928.

Lieutenant-Colonel R. Knowles, I.M.S., Professor of Protozoology, School of Tropical Medicine and Hygiene, Calcutta, is appointed to act, until further orders, as Director of the School, in addition to his own duties.

Lieutenant-Colonel A. D. Stewart, I.M.S., Professor of Hygiene, School of Tropical Medicine and Hygiene, Calcutta, is appointed to act, until further orders as Principal, Medical College, Calcutta, in addition to his own duties, with effect from the date on which he takes over charge.

Lieutenant-Colonel W. L. Harnett, M.B., F.R.C.S., I.M.S., Superintendent, Campbell Medical School and Hospital, is appointed to act as Professor of Clinical and Operative Surgery of Medical College, Calcutta, and Surgeon to the College Hospital, *vice* Lieutenant-Colonel H. B. Steen.

Lieutenant-Colonel H. B. Steen, M.D., I.M.S., Officiating Professor of Clinical and Operative Surgery, Medical College, Calcutta, and Surgeon to the College Hospital, is appointed to act as Professor of Surgery, Medical College, and Surgeon to the College Hospital, *vice* Lieutenant-Colonel Sir F. P. Connor, Kt., D.S.O., going on leave.

Lieutenant-Colonel J. D. Sandes, M.D., F.R.C.P.I., I.M.S., is appointed to act until further orders as Professor of Medicine, Medical College, Calcutta, and First Physician, Medical College Hospital.

Major C. H. Smith, O.B.E., I.M.S., an Agency Surgeon, on return from leave, is posted as Agency Surgeon in Bundelkhand, with effect from the 23rd January, 1928.

Major H. G. Alexander, F.R.C.S., I.M.S., on return from leave, is appointed to act as Police Surgeon, Calcutta, *vice* Major J. C. De.

Major J. C. De, M.B., I.M.S., Police Surgeon, Calcutta, is appointed to act as Professor of Clinical Medicine, Medical College, Calcutta, and Second Physician, College Hospital, *vice* Lieutenant-Colonel J. D. Sandes.

Major S. N. Mukherjee, F.R.C.S., I.M.S., Officiating Civil Surgeon, Chittagong, is appointed to act as Superintendent, Campbell Medical School and Hospital, Calcutta, *vice* Lieutenant-Colonel W. L. Harnett.

Major S. A. McSwiney, M.B., F.R.C.S.I., I.M.S., is appointed to act as Civil Surgeon, Chittagong, *vice* Major S. N. Mukherjee, transferred.

LEAVE.

Colonel J. D. Graham, C.I.E., I.M.S., Public Health Commissioner with the Government of India, is granted leave on average pay for 8 months, with effect from the 23rd March 1928 or subsequent date on which he avails himself of it.

Lieutenant-Colonel C. B. McConaghy, I.M.S., an Agency Surgeon, is granted leave on average pay for 8 months combined with leave on half average pay for 20 months, under the Fundamental Rules, with effect from the 24th January, 1928.

Lieutenant-Colonel Sir F. P. Connor, Kt., D.S.O., F.R.C.S., Professor of Surgery, Medical College, Calcutta, and Surgeon to the College Hospitals, is granted leave from the 29th February 1928 to the 15th December 1928.

Major F. R. Thornton, M.C., I.M.S., Civil Surgeon, Coorg, is granted leave on average pay for 8 months, with effect from the 16th March 1928 or subsequent date on which he avails himself of it.

PROMOTIONS.

Lieutenant-Colonel to be Colonel.

L. J. M. Deas, M.B., F.R.C.S.E., *vice* Colonel R. W. Knox, D.S.O., M.B., F.R.C.S. Dated 1st January, 1928.

Majors to be Lieutenant-Colonels.

W. E. Brierley, M.B., F.R.C.S. Dated 1st February, 1928.

J. B. Lapsley, M.C., M.B. Dated 1st February, 1928.

C. H. Fielding, M.B. Dated 1st February, 1928.

W. L. Watson, O.B.E. Dated 1st February, 1928.

J. W. Barnett, M.B. Dated 1st February, 1928.

M. L. Puri. Dated 1st February, 1928.

R. B. Lloyd, M.B. Dated 1st February, 1928.

A. C. Munro, M.D. Dated 1st February, 1928.

R. N. Chopra, M.B. Dated 1st February, 1928.

A. G. Tresidder, C.I.E., M.D. Dated 1st February, 1928.

G. G. Jolly, C.I.E., M.B. Dated 1st February, 1928.

H. Stott, O.B.E., M.D. Dated 1st February, 1928.

A. A. C. McNeill, M.B. Dated 1st February, 1928.

G. F. Graham, M.D., F.R.C.S.I. Dated 1st February, 1928.

M. D. Wadia. Dated 1st February, 1928.

T. D. Murison. Dated 1st February, 1928.

S. S. Vazifdar. Dated 1st February, 1928.

J. J. H. Nelson, O.B.E., M.C., M.D., F.R.C.S.E. Dated 1st February, 1928.

E. S. Phipson, D.S.O., M.D. Dated 1st February, 1928.

F. F. S. Smith, M.D. Dated 1st February, 1928.

T. C. Boyd, F.R.C.S.I. Dated 1st February, 1928.

Captains to be Majors.

R. C. Malhotra, O.B.E., M.B. Dated 18th October, 1927.

H. C. Tait, M.B.E., M.B. Dated 2nd February, 1928.

J. C. Chukerbuti, M.B. Dated 17th February, 1928.

The provisional promotion of the undermentioned officer to the rank of Captain as notified in Army Department Notification No. 1225, dated the 24th September, 1926, is confirmed, subject to His Majesty's approval:—

W. Lawie, M.B.

RESIGNATION.

Lieutenant T. D. Donegan, I.M.S. Dated 31st December, 1927.

RETIREMENTS.

Lieutenant-Colonel T. H. Gloster, M.B., I.M.S. Dated 25th August, 1927.

Colonel G. Browne, D.S.O., M.B., I.M.S. Dated 27th December, 1927.

Lieutenant-Colonel W. W. Jeudwine, C.M.G., M.D. Dated 1st January, 1928.

NOTES.

BOVRIL, LTD.

On the 25th and 26th October 1927 nearly 3,000 doctors from all parts of Great Britain visited the Bovril Factory in Old Street, London. Every country contributed its quota, including doctors from the far North of Scotland, and the remote parts of Devon, Cornwall and Wales.

The visitors were welcomed by Sir George Lawson Johnston (Chairman), The Duke of Athol, K.T. (Vice Chairman), Sir James Crichton-Browne, M.D., LL.D., F.R.S., Lieut.-Gen. Sir A. T. Sloggett, K.C.B., K.C.M.G., K.C.V.O., and other Members of the Bovril Board, and were then conducted in parties over the premises. They were much impressed by the brightness and airiness of the whole spacious building, and by the strictly hygienic conditions under which Bovril is made, as well as by the ingenious machinery which enables the Company to turn out annually so many millions of the familiar brown bottles. The splendidly equipped laboratories were particularly admired.

The processes of manufacture were followed with much interest, from the blending of the extracts and essences in the great steam jacketed pans, each capable of holding the concentrated juice of 300 oxen, and the incorporation with these of the beef fibrin and albumen which are so important a factor in the nutritive value of Bovril, to the automatic filling, capping, labelling and boxing of the bottles. The finished Bovril is conveyed by pipes to the filling machines from the great storage tanks on the floor above, each of these wonderful machines being capable of filling 400 gross of bottles per day.

Lunch followed the tour of inspection. The final item in the programme, which was also much appreciated, was a cinematograph display of scientific films illustrating the activities in the blood of various micro-organisms.

COMMON HELMINTHS IN MEDICAL PRACTICE.

THIS is the title of a little booklet issued by the Scientific Department of the Eastern and Russian Trading Co., Ltd., London; the agents for santonin. It is well illustrated and deals with the life-histories of *Ascaris lumbricoides*, *Oxyuris vermicularis* and *Trichuris trichiura*. Much recent work is referred to, and there is a useful little bibliography at the end of each chapter. The concluding chapters deal with pathogenicity; treatment by santonin and purgation; and give a historical review of the work on santonin.

We understand that copies of this little booklet are available free from the Bombay Agent of the firm; G. S. Mahomed, 164, Samuel Street, Bombay; also from the Calcutta Agents, Messrs. Turnbull Bros., P. O. Box No. 289, 112, Hare Street, Calcutta.

'HYPOLOID' QUININE IN MALARIA.

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'Hypoloid' quinine bihydrochloride is available in four metric strengths, 0.2-gm., 0.4-gm., 0.6-gm. and 1 gm. The products are issued in boxes of 10 by Burroughs, Wellcome & Co., London.

SULPHOSTAB-BOOTS.

It is recognised that in the modern treatment of syphilis the exhibition of arsenic in organic form is essential. The most rapid results are obtained by the intravenous route, but more lasting effects follow the giving of arsenic intramuscularly. On the other hand intramuscular administration is apt to be followed by the formation of painful lumps at the site of injection. Hence the need for a safe arsenical which can be administered subcutaneously. Further, such a compound is especially wanted for the treatment of congenital syphilis in infants.

Messrs. Boots claim that in their 'Sulphostab-Boots' such a product is available. It has been placed on the approved list of the British Ministry of Health. Sulphostab-Boots is a yellow powder packed in sterile ampoules ready for dissolving in sterile water, and it is stated that its subcutaneous administration is painless and is not accompanied by any reaction at the site of injection. It is of special value in the treatment of congenital syphilis, in 'syphilitic carditis' where a high concentration of organic arsenic in the blood is undesirable, and for disseminated sclerosis and chronic skin lesions where organic arsenic is often of value.

In the treatment of congenital syphilis one course—each of six weekly injections, rising from 0.10 gm. to 0.20 gm. with the rise of age from birth to 2 years—given for two consecutive years is advised; whilst three different courses are outlined for adults, in cases of primary, secondary and tertiary syphilis respectively. The course of injections of Sulphostab can be accompanied by a course of bismuth, e.g., such a preparation as Bismostab-Boots.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

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Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

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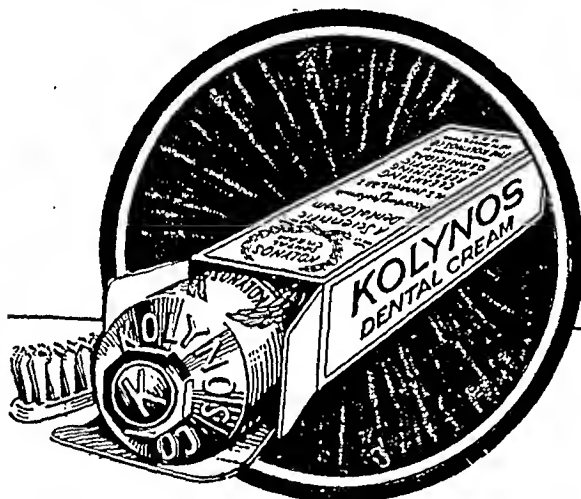
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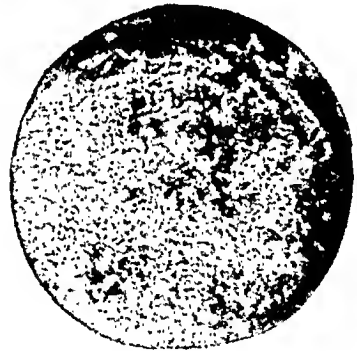
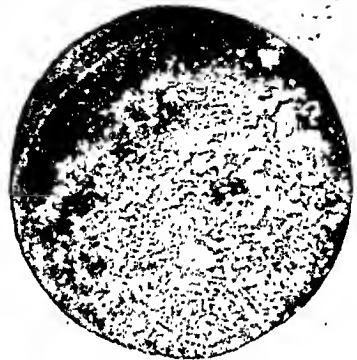
MAKE MILK DIGESTIBLE

When an infant is fed on cow's milk (or milk and water) it is well known that the milk forms a clot on reaching the stomach. The clotted milk is difficult to digest—it is often the cause of stomach disorders, and the infant may fail to thrive. The photographs reproduced here were taken in our own physiological laboratory—they prove in a graphic way the power of Robinson's "Patent" Barley in breaking up the tough, indigestible clot of ordinary cow's milk.

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Fig. 3.—Shows the finely divided precipitate formed in the stomach of an infant fed on cow's milk properly diluted with Robinson's "Patent" Barley. The precipitate of mother's milk is just like this—Robinson's "Patent" Barley makes milk digestible.



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Original Articles.

THE TREATMENT OF FRACTURE OF THE FEMUR.

By W. L. HARNETT, M.A., M.B. (Cantab.),
F.R.C.S. (Eng.),

LIEUT.-COL., I.M.S.,

Officiating Professor of Clinical Surgery, Medical College, Calcutta.

A CYNICAL old London surgeon is supposed to have told his class that the best way to treat a fracture was to send the case to the rival practitioner in the same street. Those who can recall the treatment of fractures as taught twenty years ago, with its inefficient fixation by wooden splints and the resulting overlapping and angulated fragments, wasted muscles, stiffened joints and shortened, often permanently crippled limbs will be disposed to agree that the advice quoted above, if cynical, was at any rate sound common sense. The practitioner had nothing to gain and everything to lose in reputation by handling these cases: if the result was tolerably good it was attributed to the patient's good constitution and the remarkable mending power of his bones, whilst if, as more often happened, the appearance and function of the limb left much to be desired, the practitioner would be apt to find himself talked about in the neighbourhood as a bungler and perhaps involved in costly litigation. In hospital the visiting surgeons with rare exceptions relegated these cases to the care of their house surgeons, who, with the humility natural to youth in those days, supposed this to imply that the great man looked on such trivial cases as beneath his notice. The real reason was quite otherwise; the surgeon knew that he was not likely to achieve any better result than his house surgeon would, so he had no more inducement than had his colleague in general practice to undertake a thankless task. It is no wonder that Lane's new teaching of operation in all these difficult cases was received with acclamation and appeared likely at first to revolutionise the whole subject. But it was soon discovered that Lane's imitators did not always possess his mastery of technique, and the pros and cons of operative treatment of fractures were still the subject of lively discussion at medical societies when the war enabled the matter to be investigated on a vast scale. The result has been such an improvement in methods of treatment by traction, that the field for operative interference has been narrowed down till it embraces little more than the cases where great displacement has refused to yield to traction, and certain other cases to be referred to later. Most of these improvements

centre round the manifold uses which have been made of Thomas' knee splint, for which the credit is mainly due to Major Sinclair, R.A.M.C., and to the inspiration of Sir Robert Jones.

Fractures of the femur present a more difficult problem of treatment than those of any other bone in the body. It is the largest and longest bone, it lies deeply buried in soft parts, the powerful muscles attached to it exercise a great distorting influence, its adequate repair requires that it should be restored to its full length and correct alignment as it has to act as one of a pair, and lastly it has to support the full weight of the body on a skeletal strut which is normally curved and which tends to bend under the body weight if the reparative material is not perfectly solid. All the efficient methods of treatment may be divided into three great groups:—

- (a) Treatment by abduction.
- (b) Treatment by traction with or without abduction.
- (c) Treatment by open operation.

It is not proposed in this article to do more than indicate the class of cases suitable for the third method of treatment, without describing the details of operative technique, nor will more than a passing reference be made to compound fractures. Out of the multiplicity of methods of the first and second classes available the writer has endeavoured to select for description those which in his own hands have given the best results with the simplest appliances.

FIRST AID TREATMENT.

Only too often the original fracture, serious as it is, is made incomparably worse by inefficient efforts to move the patient and by transport without adequate fixation. The sharp bone ends may be thrust into muscle, extravasation of blood increased, and perhaps important vessels injured with consequent danger to the life of the limb from pressure and to that of the patient from increase of shock. If nothing else but pieces of wood and some improvised triangular bandages are available, the excellent method taught in the first aid classes and described and figured in the *Manual of First Aid* should be adopted. The ideal method however is the use of the Thomas' knee splint, which should be available at all first aid posts. A splint of suitable size having been selected by measurement of the circumference of the thigh at the gluteal fold outside the trousers, the injured limb is grasped near its extremity and a gradually increasing pull is exerted. Maintaining extension on the angle all the time, the leg is threaded through the ring of the splint without removing the trousers, until the ring rests snugly against the tuber ischii. An assistant

then takes a 6-inch roller bandage, ties the end to the outer bar of the splint near the ring and passes it behind the thigh from side to side over the inner bar, then back and over the outer bar and so on until the whole of the posterior aspect of the limb is supported. A noose of bandage is applied round the ankle over the boot and tied to the end of the splint with sufficient tension to maintain the requisite extension. Sinclair's "boot clamp" or a *skerwer* thrust through the upper of the boot between the sole of the foot and the sole of the boot, with tapes attached to tie to the end of the splint are more efficient methods of maintaining extension and are to be preferred if available. The patient is lifted on to a stretcher which should be fitted with a "suspension bar" to which the side bars of the splint are slung to prevent the side bars from falling back and forcing the limb too far forward, which would increase the deformity and cause pain. An alternative plan is to rest the end of the Thomas' splint below the sole of the boot on some form of support such as rolled up clothing. Only after the limb has thus been securely fixed should the clothing be cut away at the site of fracture to deal with any wound which may be present. Finally, a firm pad should be placed on each side of the knee between the limb and the side bars, and the leg and splint bandaged at this level to give greater security. Cotton-wool should be padded in the space between the thigh and the ring to prevent the ring from slipping upwards or inwards and losing its purchase against the tuber ischii. The patient is now ready for transport and the apparatus should not be further disturbed until the patient is in hospital or nursing home and the permanent extensions are substituted. If a long journey has to be taken it is well to remember that temporary extension taken from a boot should not be too great or persisted in too long, lest pressure of the boot cause obstruction of the dorsalis pedis artery and ulceration or even gangrene. Morphia and warmth are of course indicated to combat shock and pain during transport.

TREATMENT BY ABDUCTION.

Fig. 1 shows the usual sites of fracture at the upper end of the femur. No. 1 lies at the border between the head and neck, but is sometimes situated a little lower at 2. This is called the subcapital fracture and is always intracapsular. The shortening is not great (about $\frac{1}{2}$ — $\frac{3}{4}$ inch) and the limb is everted and adducted. This is the fracture which is notable for the great frequency with which it fails to unite. This tendency used to be attributed to old age, but this is not correct because the fracture unites quite well in old people if properly treated, and is just as obstinate with regard to non-union in a young

man as in an old one if special treatment is not adopted. The causes of non-union are in order of importance (1) defective blood supply of the upper fragment; (2) defective apposition of the fragments; (3) interposition of torn portions of the capsule; and (4) the inhibitive influence of the synovial fluid depositing a fibrous surface on the raw bone and so sealing up its cellular elements. If the fragments are firmly and accurately apposed, bony union will take place with certainty, but if correct treatment is delayed rapid atrophy of the proximal fragment will occur and within a few months all that part of the neck of the femur which is attached to the head will disappear.



Fig. 1.

No. 3 in Fig. 1 shows a fracture which runs along the base of the neck where it merges with the trochanter mass and is known as the intertrochanteric fracture. It is partly intracapsular and partly extracapsular, as the capsule is attached anteriorly to the femur along the intertrochanteric line, whilst posteriorly its line of attachment runs about midway between the head and the trochanters. It is a common fracture and is often associated with a fracture in the trochanter mass, in which case its treatment is similar to that of the class of case to be next described. In its uncomplicated form its signs differ little from the variety just discussed except that the shortening is greater, about 1—1½ inches, and the treatment is the same.

In fracture of the neck of the femur, the head being fixed in the acetabulum, the displacement is always of the outer or limb fragment. If the separation is complete the displacement is usually upward, backward and outward, and to appose the fragment the limb must be lifted forward, rotated inward and drawn downward to its normal length. The normal abduction of the hip is limited by the contact of the great trochanter with the tissues above the acetabulum. When the limb is normally abducted the under part of the capsule is rendered taut and tends to retain the broken neck or head in normal relations, while the abducted position itself helps to force the broken neck more and more into its natural relations. In an impacted fracture the abducted position serves to reduce deformity without altogether separating the fragments and completely

on a level pelvis with all the landmarks corresponding, and the attitude in which the limb is fixed after adjustment of the fracture is one of complete abduction, complete extension and slight inward rotation. The body is then covered with flannel bandages reinforced by cotton wadding at pressure points and a plaster-of-Paris casing applied from the nipples to the toes of the affected side, a malleable iron bar being incorporated over the hip joint or several additional thicknesses of plaster to maintain the joint in complete extension. When the plaster is firmly set the patient is placed in bed and the head of the bed raised a foot or so by blocks. The opposite leg may be incorporated in the plaster by a spica extending down to the knee; this has the advantage of fixing the pelvis very firmly but restricts movement and so adds to the patient's discomfort. If

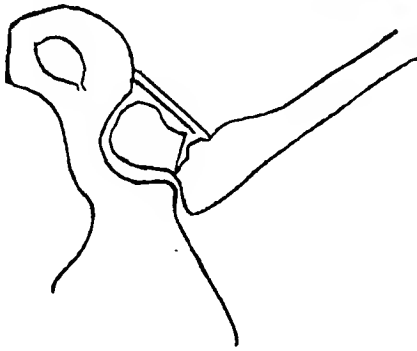


Fig. 2.

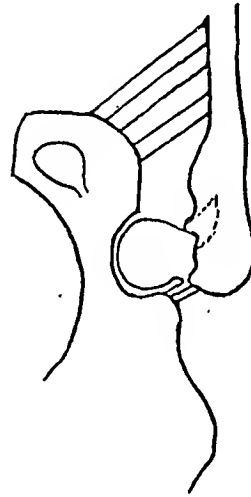


Fig. 3.

breaking up the impaction. In complete and unimpacted fractures the abducted position adjusts the fragments and fixes them. Figs. 2 and 3 illustrate the limitation of abduction caused by persisting deformity producing traumatic coxa vara, and the way in which forcible abduction restores the normal angle.

The patient having been anaesthetised, is placed upon an orthopaedic table provided with a pelvic rest and a perineal bar for counterpressure, but if these appliances are not available an ordinary table will serve. The limbs extended side by side are each supported by an assistant. Direct manual traction on the limbs is then made until the shortening has been reduced as demonstrated by comparative measurements. The injured limb is then rotated until the patella points slightly inward and the two assistants, still exerting equal traction on the limbs, then abduct them, that on the sound side slightly in advance, in order to demonstrate the normal range and to balance its fellow and prevent tilting of the pelvis. A final inspection shows the extended limbs equally abducted

the spica has been properly applied it is more comfortable than any traction apparatus which entails prolonged rest on the back. The plaster spica is retained eight to twelve weeks, a time sufficient to ensure adhesion of the fragments, but by no means a union capable of supporting the body weight. The patient after its removal remains in bed for two or three weeks longer for massage and passive and active movements, especial care being taken that abduction does not undergo limitation as is very liable to happen. A caliper walking splint is then fitted and the patient is allowed up. This splint must be worn until the X-ray shows perfect consolidation and full control of the limb has been restored.

In the young a separation of the upper epiphysis of the femur is comparatively common as a sequel of an injury, and is often overlooked for some months. A slight persistent limp leads to the discovery that the limb is shortened about half an inch and markedly adducted. A radiogram shows that the neck of the femur has been pushed

upwards and, is set at an angle of 100° or even 90° with the shaft, thus constituting one form of adolescent coxa vara. If recognised soon after the accident the treatment is to replace the neck in proper alignment with the head by forcible abduction and fixation in plaster-of-Paris. At a later stage when union in faulty position has occurred either a reconstruction of the fracture or subtrochanteric osteotomy will be required.

Cases occur where the abduction treatment has failed and non-union has resulted. These cases should be submitted to operation either by screwing or pegging the fracture if recent, or by Whitman's reconstruction operation if the non-union is of long standing. The description of this ingenious operation will be found in textbooks of orthopaedic surgery.

TREATMENT BY TRACTION.

Referring again to Fig. 1, the next site of fracture is that indicated as No. 4, the pertrochanteric fracture. The line of fracture

backward by its own weight and is pulled inwards by the adductors and upwards by the hamstrings. Thus the separation of fragments may be so great as to allow the interposition of a considerable bulk of muscle tissue which may lead to non-union. Whatever method of treatment be adopted, it is essential that the shaft of the bone be brought into line with the upper fragment by flexion and abduction.

In the middle third the fracture is more commonly oblique or spiral if due to indirect, transverse if due to direct violence. The overlapping and shortening is considerable and there is great tendency to angulation backwards or outwards, due to the action of gravity and the retraction of the adductor muscles. Reduction may be difficult owing to one or both of the sharp fragments being driven into the surrounding muscles. In the treatment of this fracture special care must be taken to sling the thigh in such a manner as to restore the natural anterior bowing of the femur. Fig. 4 shows how abduction in

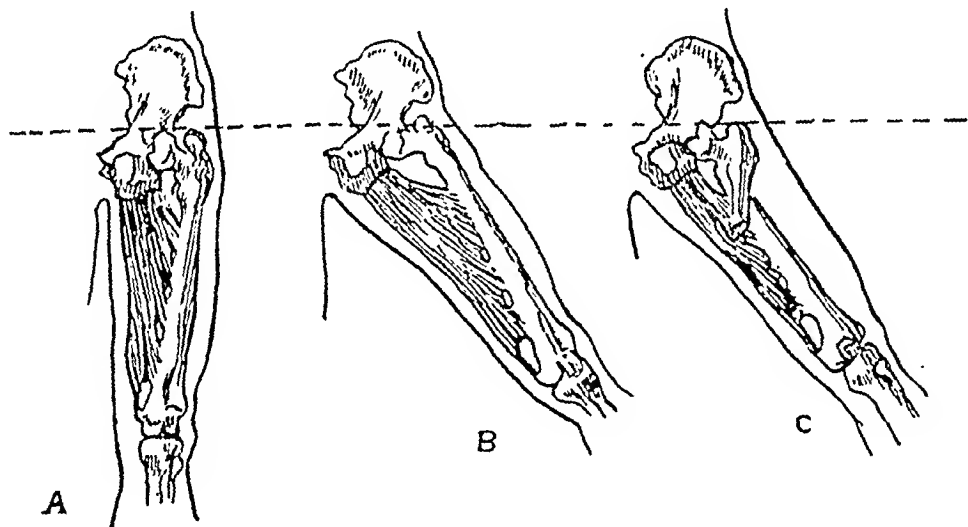


Fig. 4.

passes through the trochanteric mass, comminution and impaction are commonly present, the neck of the femur being driven like a wedge into the trochanter splitting the latter into several fragments and separating off the lesser trochanter. This fracture is wholly extracapsular, there is $1\frac{1}{2}$ —2 ins. of shortening and the leg is strongly adducted and fully everted. There is an ample blood supply and there is no tendency to non-union in these fractures, but unless the shortening and adduction are corrected union takes place with very gross deformity.

Fracture No. 6 in Fig. 1 is the subtrochanteric fracture and lies in the upper third of the shaft of the femur. Its characteristic feature is that the upper fragment is tilted forward by the ilio-psoas muscle and abducted by the muscles attached to the great trochanter, whilst the lower fragment falls

this class of fracture may actually increase deformity. A careful study of the radiograph is essential for correct treatment and it is in these cases that a portable outfit, which will enable the position of the fragments to be checked after the extensions are applied, is so valuable.

In the lower third the dominating factor is the backward displacement of the lower fragment by the action of the gastrocnemius and the danger of pressure upon the vessels and nerves in the popliteal region. In oblique fractures the sharp pointed upper fragment may be driven into the quadriceps muscle. Unless the backward displacement is corrected it will lead to a condition of genu recurvatum when the patient begins to walk.

In all these fractures traction is the all important element in the treatment, combined with a varying degree of abduction in the

high fractures. Traction may be applied in two ways:—

(a) Fixed or passive traction is practically the same method as described above for first aid. After reduction under anæsthesia the limb is fixed in a straight 'Thomas' splint using a strapping or glued extension, the foot is held up at a right angle by a sole plate or some other form of support, and counter-fixation is secured by the back part of the ring fitting snugly against the tuber ischii. This method acts well in children, but in adults sufficient extension cannot be obtained without risk of slipping of the strapping, and the pressure of the splint against the tuber ischii is apt to cause soreness. This drawback may be obviated by employing the splint on the Hodgen principle, that is by raising the foot of the bed about six inches and utilising the patient's body weight to produce counter-traction. The Hodgen splint is bent at the knee and is suspended from a fixed point situated above and distal to the foot, the oblique suspension cords producing a long-axis traction against counter-fixation obtained by raising the foot of the bed. Neither of these methods are so efficient as:

(b) Active traction, which may be applied by adhesive strapping, by glued gauze, or by transfixion pins or calipers. Adhesive strapping, if fresh, holds well and is not irritating to the skin if a good brand of zinc oxide plaster be employed. Strips of gauze fastened by glue was a popular method during the war, but has not proved so successful in this country. Whether the reason lies in the quality of the glue or whether it be the heat and humidity which prevents it setting properly, it will be found that not only is the hold defective, but it is irritating to the skin. Pearson's modification of the Beasley caliper, which takes a grip of the condyles of the femur through two small incisions just above the condyles and is adjustable so that the points of the instrument do not penetrate the bone was very popular during the war in cases of compound fracture where extensive wounds rendered it difficult to use traction taking purchase from the surface of the limb. In the same class of case occurring in civil life it has a distinct though limited sphere of usefulness.

The limb having been fixed in the splint by strapping or glue, is slung and a weight is attached to the end of the splint by a cord running over a pulley, the foot of the bed being raised about 6 inches to provide counter-extension. The weight required for an adult is about 15 pounds or more, and herein lies the weak point of the method. Any form of extension except a caliper is bound to slip under the pull of these heavy weights, especially in this country where strapping does not hold as it does in temperate climates. As it gives way it usually takes some of the

epidermis with it, leaving an excoriated surface on which it is impossible to apply a fresh extension. One is then driven to employ an ankle, an unsatisfactory and dangerous method, or a Pearson caliper. All this can be avoided by employing a method which admits of efficient extension being obtained with a smaller weight. Such a method was described by Hamilton Russell of Melbourne in 1924(1) and the present writer, having adopted the method soon after it was published, is of opinion that the results obtained are superior to those yielded by any other method of treatment. It combines the method of active traction with the Hodgen principle, the weight required is light and no splints are employed. It is applicable to all fractures of the femur except the intracapsular group and those of the condyles. The principle involved is shown in Fig. 5 A. When the surgeon reduces a fracture of the femur he places one hand under the knee whilst the other grasps the leg above the ankle, the direction of the forces exerted by the surgeon's hands are shown by the arrows. By constructing a parallelogram of forces on them it will be seen that the resultant will be in the line of the thigh, the direction in which traction should be steadily exerted during process of repair.

Fig. 6 makes the arrangement of the apparatus clear. A Balkan frame is ideal, but it is possible to improvise this out of bamboo or other materials, the uprights at the head and foot being lashed to the frame of the bed. Four block pulleys which can be attached to the frame at various heights, and the ordinary materials for extension are the only other requirements. Usually an anæsthetic is not required for the application of the apparatus, unless the patient is restless and there is comminution of the fracture or much extravasation of blood. The leg having been prepared in the ordinary way is fitted with a "spreader" or stirrup close to the sole of the foot, attached to the leg by broad strapping strips carried up as far as the knee but not beyond it. A pulley is attached to the spreader by a bolt and nut. The extension strips should be firmly bandaged or the margins of the strapping may be split and carried up the limb in a spiral manner. Circular bands are dangerous unless great care is taken to apply them only at points where the limb is diminishing in circumference and to see that there is no pressure over the tendo achillis or immediately over the tibial tubercle. It is well to cut a hole in the strapping just below the head of the fibula to save the external popliteal nerve from all possibility of pressure. A broad sling—a folded towel answers admirably—is now passed beneath the knee, the ends of the sling are knotted together with a cord which is then passed through the pulleys on the following order:—

(a) to a pulley placed on the horizontal bar in such position that a vertical dropped from it will meet the leg well below the knee; (b)

the spreader, and finally after passing through the lower pulley on the upright the cord is tied to a weight of about 8 lbs. for an average

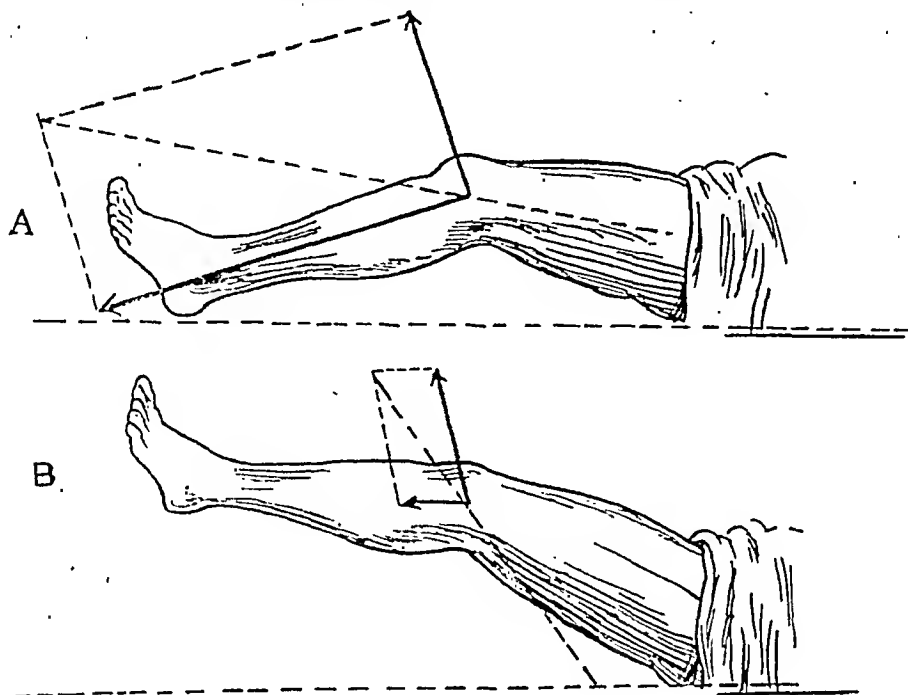


Fig 5. (After Hamilton Russell.)

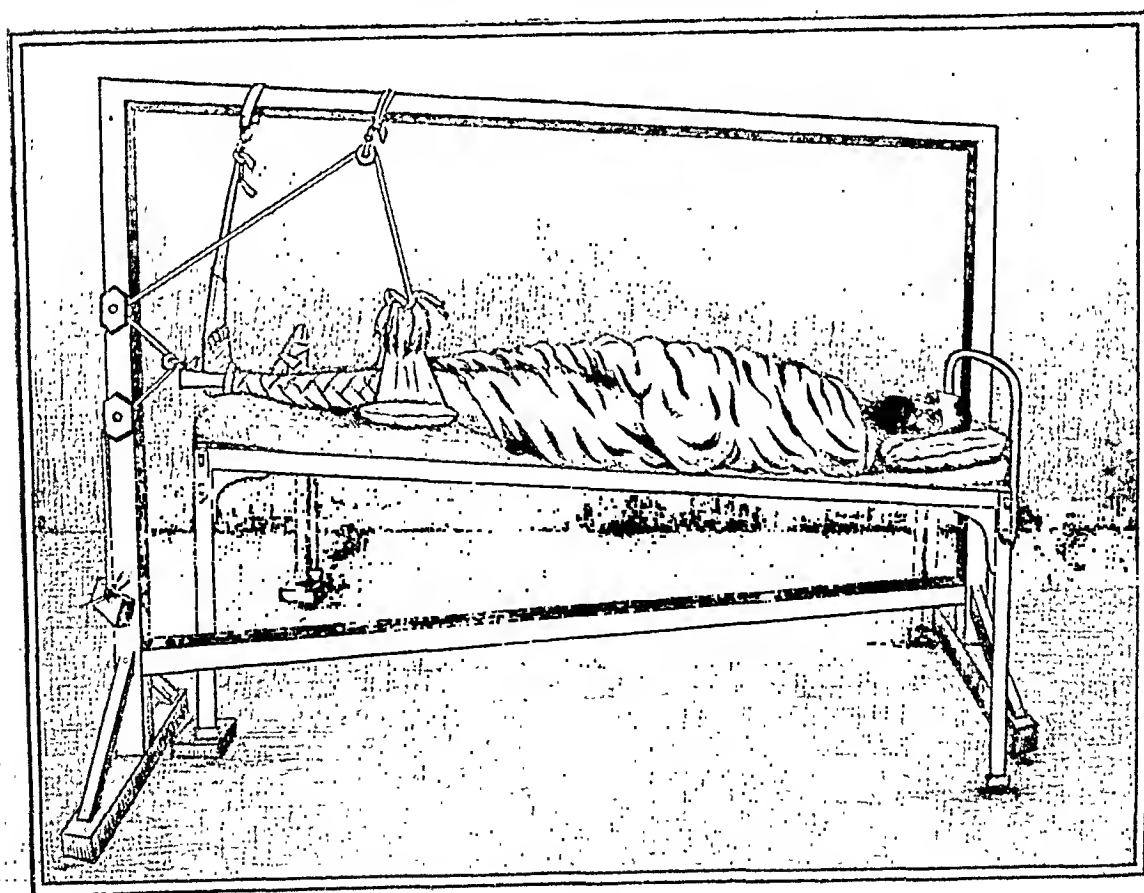


Fig. 6.

thence to a pulley on the upright at the foot of the bed; (c) thence through the pulley on

adult. After all these adjustments have been made the surgeon reduces the fracture in the

PLATE I.



Fig. 1.—A fracture in the middle third, 1 inch shortening but good alignment.



Fig. 2.—The same 5 weeks later. No measurable shortening.



Fig. 3.—A pertrochanteric fracture with bad comminution. There is a great tendency to coxa vara in such cases.



Fig. 4.—The same 5 weeks later; except for some shortening of the neck caused by the impaction and tending to slight limitation of abduction, the result is satisfactory.

PLATE II.



Fig. 5.—A spiral fracture in the upper third. No abduction necessary in this case.

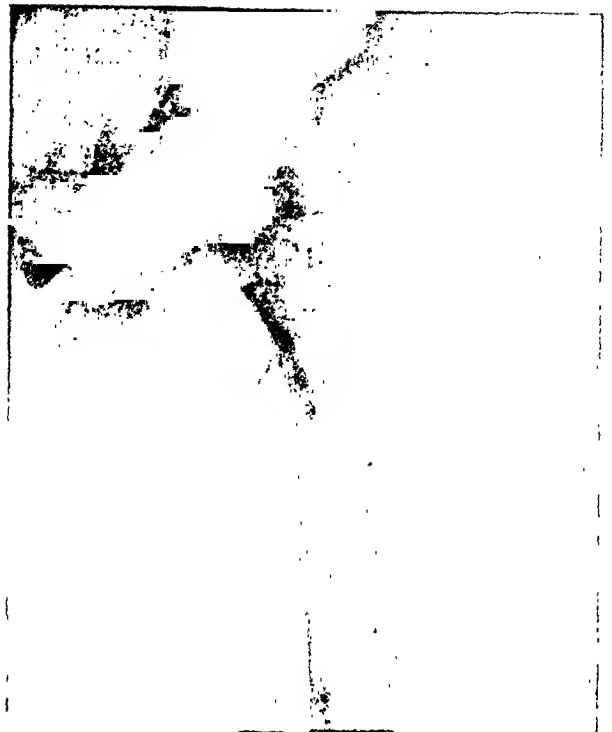


Fig. 6.—A spiral fracture in which moderate abduction was needed 5 weeks after the accident. No shortening and good alignment but some delay in union owing to separation of fragment.

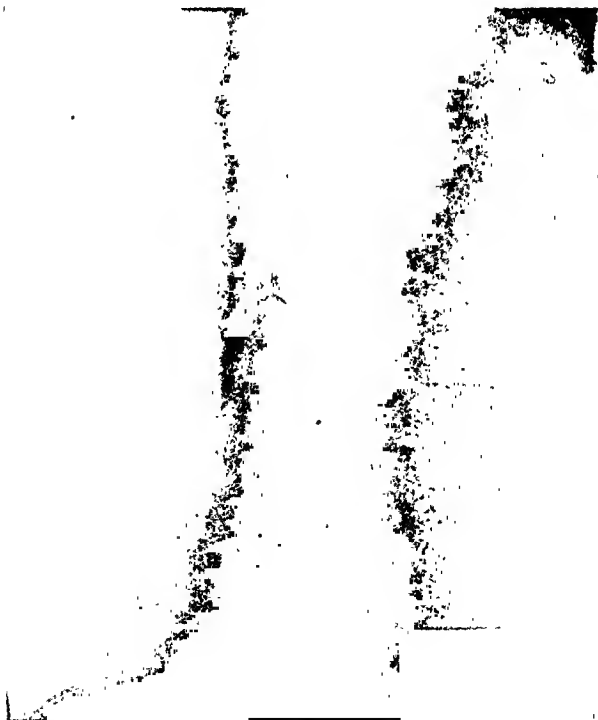


Fig. 7.—A very bad type of fracture in the upper third with much shortening, wide separation and comminution. Likely to give a very bad result.



Fig. 8.—The same 7 weeks later. Insufficient abduction was employed, but there is only half an inch shortening, the alignment is good and the ultimated functional result will be excellent.

manner described and after slowly tightening up everything allows the weight to come into play. A soft pillow is now adjusted beneath the thigh to prevent gravitational sagging at the seat of fracture. Care must be taken that the heel does not touch the bed and a strip of strapping is attached to the sole and carried up to the horizontal bar to prevent foot drop. The foot of the bed should be raised 4 to 6 inches.

The arrangement described above provides that the pull on the leg is nominally double the upward lift at the knee, though actually somewhat modified by friction between cords and pulley. It will be observed that, contrary to the usual custom, the extension strapping does not pass above the knee. The supposed danger of straining the ligaments of the knee by taking extension through them is imaginary, since these ligaments are attached to a fragment of the femur and so cannot be stretched. Eversion gives no trouble as the slightly flexed knee is kept straight by the sling. If properly attended to the apparatus is very comfortable and readily permits of nursing. Constant supervision by the house surgeon is necessary, as the position of the patient relative to the line of traction is apt to vary, the pillow beneath the thigh may get displaced and so on. Fig. 5 B illustrates what may happen if the upward lift is too vertical, with the result that the traction will tend to increase that backward sagging of the femur which it is our principal object to prevent. The method is applicable to patients of all ages and to any fracture of the shaft. The amount of abduction can be varied at will by shifting the uprights so that the foot end of the Balkan frame is either inside or outside the legs of the bedstead. In Fig. 6, which represents the treatment of a fracture in the upper third, the Balkan frame is shown set for the abducted position. In middle and lower third fractures it would be within the legs of the bedstead.

The extension must be maintained for about five weeks on the average, by which time consolidation will be so far advanced that there will be no risk of late shortening developing. Needless to say this period varies considerably with the age and constitutional condition of the patient and the surgeon must be guided by what he finds at the seat of fracture and by the radiogram rather than by any set rules. The patient then lies in bed for another two weeks moving his limbs freely and being massaged daily. Meantime a walking caliper splint(2) is being made and when this has been fitted the patient is allowed up. The X-ray picture will show when it is safe to discard the walking caliper, usually about the end of the fourth month, but this will vary with the actual position of the ends of the bones; a slight lateral displacement with little or no shortening may delay

complete consolidation by a month or two. If a walking caliper cannot be fitted, the patient must be allowed up on crutches with the limb slung. After a time when a little weight can be borne sticks are substituted for the crutches and so on, but the risk of a fall and refracture during the early stages makes this method an anxious business.

The writer has been using this method for some four years and is entirely satisfied with it. Shortening is usually $\frac{1}{4}$ to $\frac{1}{2}$ inch, and in many cases there is none at all. The radiograms show that the bones have been brought into satisfactory apposition. It is rarely possible to obtain that exact anatomical reconstruction which follows a successful operation, but this is not necessary for function.

When a compound fracture is present, this method is more difficult to apply as the application of the dressings entails continual disturbance of the pillow under the thigh and therefore of the alignment. Fig. 7 illustrates the arrangement advocated for these cases. A Thomas' splint bent at the knee is fitted, extension strapping is applied to the limb and fastened to the end of the splint by tapes sewed on to the strapping. A weight of about 10 lbs. is attached to the end of the splint by a cord running over a pulley and the splint is slung in such a manner that there is a distinct forward as well as upward pull, as in the Hodgen method. Very satisfactory extension can be thus maintained and the wound is easily reached for dressing by opening the slings which consist of broad bands of flannel attached to the side bars of the splints. A reservoir for Dakin's solution for the Carrell-Dakin treatment can be suspended from the bar of the Balkan frame.

In subtrochanteric and high upper third fractures very considerable abduction will be required to bring the lower fragment into correct alignment. In such cases a radiogram should be taken early in the course of treatment. If the result shows the fragments to be in a position such as those in Plate II, Fig. 7 the patient should be anaesthetised and an endeavour made to manipulate the fragments into better apposition; whether this is successful or not the limb should then be put up widely abducted in a straight Thomas' splint with the usual weight extension. In such cases the fragments will often be found to be united only by soft callus after seven or eight weeks, owing to the separation of the fractured ends. A few weeks fixation in a plaster-of-Paris spica will usually result in sufficient consolidation for a caliper splint to be fitted, which should be used until the radiogram shows firm ossification, usually six months or more from the date of the accident. Patience is essential with these cases, but if sound orthopaedic methods are employed, the results are generally functionally satisfactory.

though not anatomically so pleasing as those obtained by operation. Plate II, Fig. 8 shows a consolidating fracture in which measures to abduct the lower fragment were not taken sufficiently early. There is considerable separation and union is delayed, but the alignment is good and there is barely half an inch of shortening, the functional result promises to be just as good as could have been obtained by operation.

Very few cases will require operation if the above lines of treatment are carried out. Occasionally it happens that a sharp end of bone perforates muscle with the result that

or malunion, and these constitute a problem in orthopaedics which is outside the scope of this paper.

Fractures of the condyles and separation of the lower epiphysis are intra-articular lesions requiring quite different treatment. By manipulation under anaesthesia the fragments are got into good position and the joint is maintained in flexion until a walking caliper can be fitted. Most of these cases however call for open operation and usually result in an ankylosed knee joint. If this is inevitable the surgeon should see that it takes place in full extension.

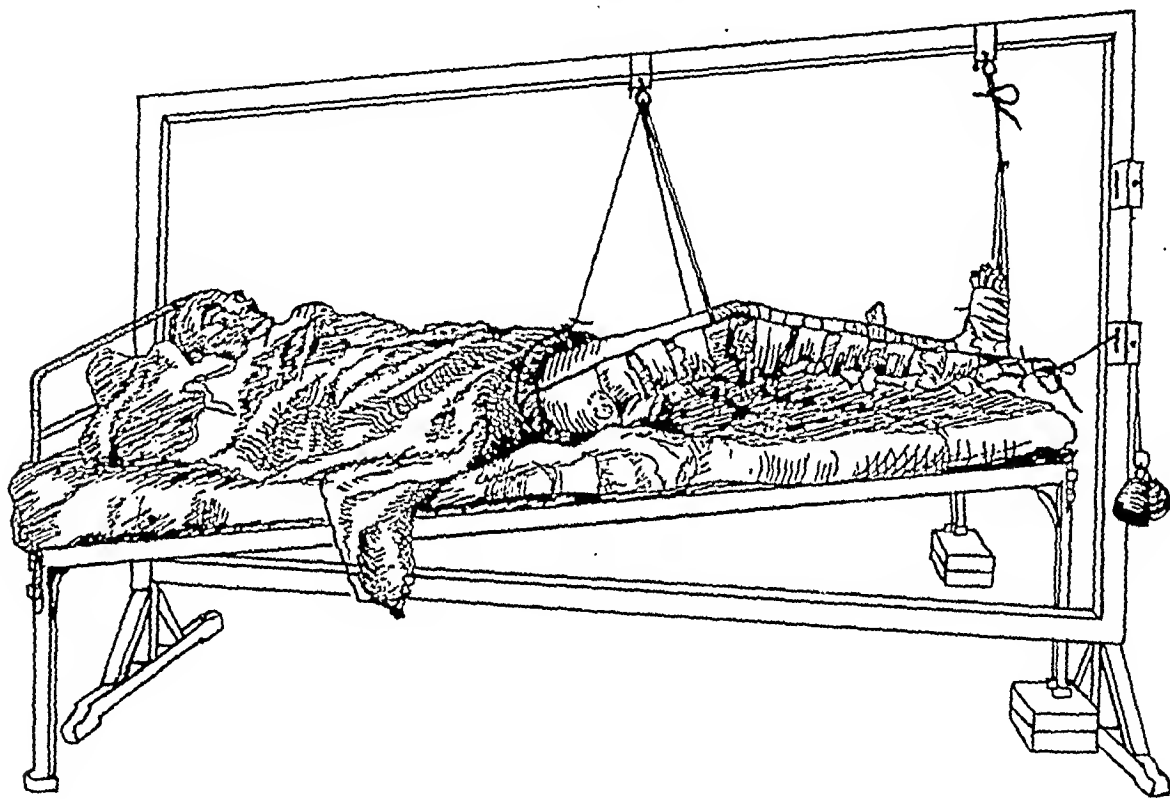


Fig. 7.

the shortening can only be reduced by the exercise of considerable force and then recurs as soon as the pull is released with a feeling of elastic recoil which is quite characteristic. A lump can usually be felt caused by the projection outwards of one of the fractured ends, and operation in these cases is imperative. The fragments should be cleared of interposed muscle tissue, and fixed or not as may be judged necessary. If fixation is employed, Parham's hands are best for these oblique sharp-pointed fragments which are difficult to fix by Lane's plates. The only other cases requiring operation are those where other lines of treatment have led to failure of union

My best thanks are due to Rai Dr. Lal Behari Ganguly Bahadur, Teacher of Medicine, Campbell Medical School, for the excellent radiographs with which this paper is illustrated and to Sub-Assistant Surgeon Dr. Surendra Nath Moitra, Resident Medical Officer of my ward, to whose interest and careful supervision the excellent results obtained are largely due.

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ARTIFICIAL PNEUMOTHORAX TREATMENT IN INDIA.

AN ANALYSIS OF 306 CASES.

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FOR many reasons in India it is almost impossible to keep more than a few patients under artificial pneumothorax treatment longer than one or two years. In the West the refills are usually continued for three to four years, and in many cases even for several years more. The question is, therefore, is it worth while under Indian conditions to begin what R. C. Wingfield of Brompton Hospital Sanatorium has described(1) as "the most important advance that has been made in the treatment of tuberculosis in recent years"? This is the question considered in this paper.

HISTORICAL REMARKS.

The introduction of artificial pneumothorax treatment into India was made comparatively few years ago. In Europe it is now more than forty-five years (1882) since the Italian doctor, Forlanini, began to experiment with insufflation of air into the pleural cavity as a treatment against pulmonary tuberculosis. His results were published in 1895, and following him other doctors on the Continent began to investigate the value of this new method. In 1907 Saugman of Denmark put the treatment on a really scientific basis by introducing the water-manometer as the indicator for determining the presence or not of the needle in the pleural cavity, and for judging the amount of air to be insufflated.(2) The introduction of the manometer made the whole pneumothorax treatment safer and more perfect.

Four years after this improvement the treatment was employed in England for the first time, but for several years it was used and advocated by only a few specialists. Lately, however, it has gained much ground as can be seen from recent literature.

THE PRINCIPLES OF THE TREATMENT.

The principles are exceedingly simple. By the insufflation of air into the pleural cavity the diseased lung is collapsed and thereby immobilized. The effect of the collapse is that the toxins contained in the lesions in the lung are, so to speak, squeezed out of it like water out of a sponge. The sudden inflow of toxin into the circulation produced by the collapse is often the cause of a sharp rise of temperature on the day of insufflation. After these toxins have been neutralised or excreted the temperature falls again. Any fever present previous to the treatment may soon totally disappear, as the immobilization following the collapse prevents new toxins being produced and circulated to the same extent as before, because of the reduced size of the collapsed lung and of any cavities present, and

specially because of the stasis created in the lymphatic vessels by the pressure. Further, the blood stasis also produced by the immobilization is beneficial to the natural healing process of formation of fibrotic tissue and scars. The treatment practically puts the diseased lung out of function and so prevents it from having an adverse influence on the whole body. In this way, theoretically, artificial pneumothorax treatment is an ideal measure, and fortunately it often is so in reality, giving the most strikingly good results.

Nevertheless, in many cases, pneumothorax treatment does not produce a satisfactory result. This is no cause for discouragement of the use of the treatment and it is not surprising, when we take into consideration both the serious nature of the disease, the degree of activity present in such cases, the extent of the lesions, the condition of the contralateral lung which is often affected as well, and the presence of complications. The ultimate good results depend also upon whether a complete or partial collapse is obtained, and this depends again upon absence or presence of adhesions in the pleural cavity.

From this it will be understood that the treatment is only to be used in selected cases and with great reservation as to the results to be obtained, because a marked initial improvement often changes during the course of refills to a condition which is little different from that previous to the treatment. Such a possibility should always be kept in mind when this treatment is suggested to a patient.

With this reservation it can be said that pneumothorax treatment has proved to be a remarkable one. Large statistics regarding the after-results of it are now available for judging its real value. There is a wonderful agreement as to the results obtained. The value of the treatment can best be expressed in the words of C. Matson and his colleagues(3) that it is conservative to estimate that the treatment will restore to health 40 to 50 per cent. of the cases having forms of chronic and acute phthisis of whom, otherwise, not over 7 per cent. would recover.

THE RESULTS IN INDIA.

During the last seven years at Arogyavaram we have treated with artificial pneumothorax 306 patients.

In 90 out of this number it was not possible to find free pleural space. This proportion of patients with adhesions in the pleural cavity corresponds to what is usually found elsewhere, namely one in three or one in four. These patients originally selected for pneumothorax treatment and not receiving it, serve as controls in our investigation, because they have all been treated in the sanatorium under exactly the same conditions as those to whom the treatment could be given.

From the following tables it will be seen that we have given the treatment chiefly to patients in the very advanced stage of the disease. No real improvement can therefore be expected in

these patients unless they have been at least half a year under treatment. This has been impossible in a great number of cases, and the pneumothorax treatment has had to be discontinued for purely medical reasons, such as the presence of or the formation of adhesions, the contralateral lung not being able to stand the strain of the whole work of respiration, and tubercular or other complications.

In order to do justice to the real value of the treatment we have therefore divided our patients into two groups, those who have had the treatment for less than half a year, and those who have had it for more, as shown in Table I.

TABLE I.

Duration of Artificial Pneumothorax Treatment of 216 Patients.

Duration of Treatment with Artificial Pneumothorax at the Sanatorium.	Number of Cases.
Less than six months	124
More than six months	44
" " 1 year	42
" " 2 years	6
" " 3 years	0

It will be seen that of 216 patients in whom air was introduced, in 124 the treatment lasted less than six months; indeed in some not more than a few days. In 92 patients it continued longer; in 6 only more than 2 years, 42 between one and two years, in 44 between six months and one year. Compared with the duration of treatment in the West our patients have been treated for a comparatively very short time.

The result of treatment of the 216 patients together with the 90 controls is shown in Table II.

TABLE II.

Result of Treatment of 216 Patients, with 90 Controls.

	Number of Cases.	Stage.	Died during 1921 to 1928.	Unknown in 1928.	Living, but not able to work in 1928.	Living, but clinically well and able to work in 1928.
Treated with artificial pneumothorax more than six months.	92	{ II, 10% III, 90%	30=32·8%	8=8·7%	13=14·0%	41=44·5%
Treated with artificial pneumothorax less than six months.	124	{ II, 7% III, 93%	52=41·9%	36=29·0%	27=21·9%	9=7·0%
Controls. Pneumothorax attempted, but no air insufflated.	90	{ II, 5% III, 95%	47=52·2%	12=13·3%	22=24·4%	9=10·0%

By the term "clinically well and able to work" is understood that the patient has become free from the clinical symptoms of the disease, that

he has no fever even after work and exercise—that the cough and sputum have ceased or almost ceased, that he has gained considerably in weight, and that he feels perfectly well in all respects. In 25 per cent. of these patients tubercle bacilli are still to be found in the sputum (75 per cent. have lost the bacilli), and in a number some signs of disease are still to be heard in the lungs, although from a clinical point of view the disease has become inactive.

From the table it will be seen that in each of the three groups 90 per cent. or more of the patients were in the III stage and that no patient was in the I stage. Of these patients 44·5 per cent. are "clinically well and able to work" from amongst those who have had the treatment more than 6 months, compared with only 7 per cent. of those having had it less than 6 months, and 10 per cent. of the controls.

It is possible that, if we knew the after-history of those whose present condition is unknown, the percentages in the different groups might be changed, but it would not be to an extent sufficient to affect the main results. The fact that about 32 per cent. of those treated longer than six months (*see* Table II) are known to have died during the years under review is a strong warning against being over-enthusiastic about the value of the treatment. The percentage of deaths is approximately that found all over the world. On the other hand the fact that 44·5 per cent. are clinically well and able to work is certainly encouraging when compared with the low percentages of the other groups. The pneumothorax treatment even brings those III stage patients who have been treated more than half a year and who have had a complete pneumothorax prognostically into line with the I and II stage patients. From Table III it will be seen that of this group of III stage patients 58 per cent. are clinically well and able to work; this figure is close to that of 66 per cent. being the percentage of 534 patients in

the I and II stages treated in the sanatorium during the same seven years, who are now alive and able to work, namely 352.

PLATE I.
Types of Artificial Pneumothorax.
(Photos by U. M. T. SANATORIUM).

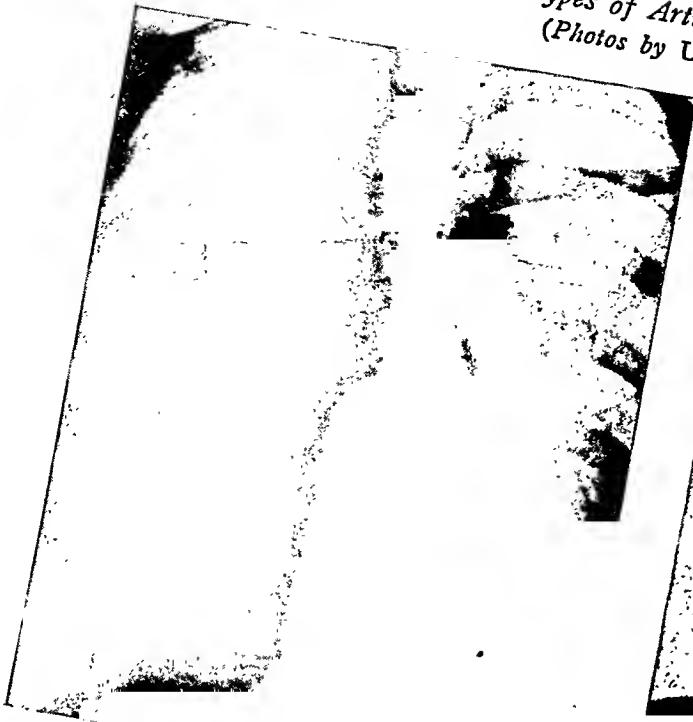


Fig. 1.—Complete pneumothorax in right side. Lung seen as shadow at hilus.—Result: clinically well. Treatment continued.

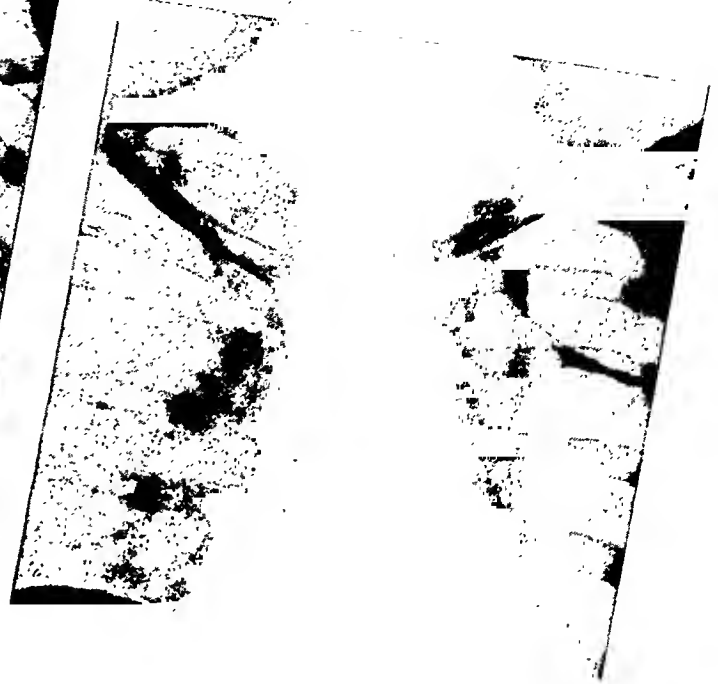


Fig. 2.—Partial pneumothorax in left side. Strong adhesion. Result: clinically well; still under treatment.



Fig. 3.—Old fibrotic tuberculosis of right lung. Heart pulled over to right side.

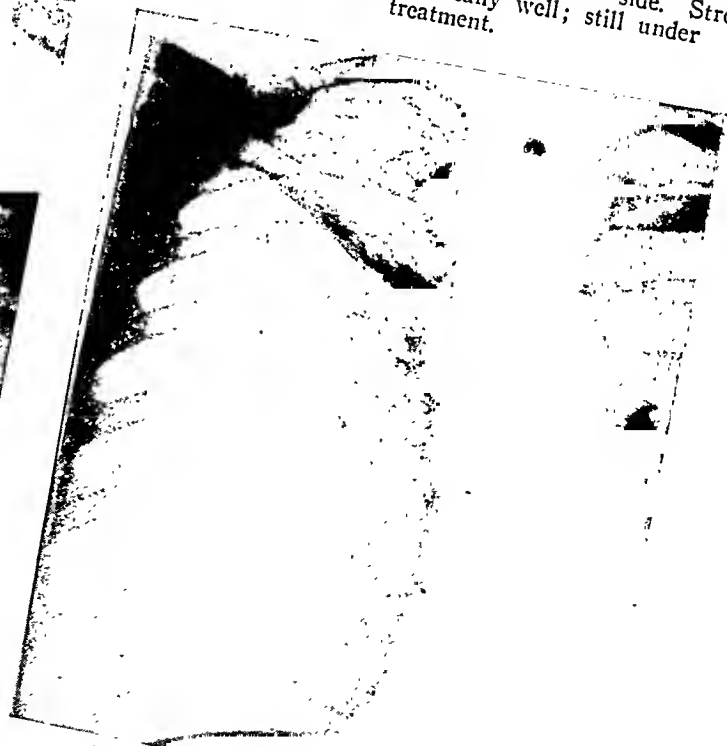


Fig. 4.—Same patient as in fig. 3. after pneumothorax.—Adhesions upper part preventing complete collapse. Heart pushed back. Result: greatly improved; still under treatment.

PLATE II.
Types of Artificial Pneumothorax.
 (Photos by U. M. T. SANATORIUM).



Fig. 5.—Partial pneumothorax in left side. Small adhesion at apex; effusion. Result: improved; still under treatment.



Fig. 6.—Old fibrotic tuberculosis in left lung. pneumothorax tried in vain, no free pleural space.



Fig. 7.—Severe tuberculosis in right lung. Female patient.



Fig. 8.—Same patient as in fig. 7, after pneumothorax.—Almost complete collapse. Result: greatly improved; still under treatment.

TABLE III.
Difference in Result of Complete and Partial Pneumothorax.

	Number of Cases.	Clinically well and able to work.
Complete pneumothorax	57	33 = 58 per cent.
Partial pneumothorax ..	35	8 = 23 per cent.

The prognosis for the patients with only a partial collapse is here seen to be much less hopeful, for of 35 of these patients only 8, or 23 per cent. are clinically well.

The condition of the patients in relation to the time since pneumothorax treatment was begun, without reference to the duration of this treatment, is shown in Table IV. It should be kept in mind (as seen in Table I), that none of these patients have had the treatment for three years, and only six more than two years, while the great majority of those who became well had it for less than two.

TABLE IV.
After-results of Treatment of 216 Patients.

Time from beginning of artificial pneumothorax without reference to duration of this treatment.	Died during 1921 to 1928.	Unknown in 1928.	Living but not able to work in 1928.	Living but clinically well and able to work in 1928.
Less than six months ..	27	..	23	3
More than six months ..	19	4	6	6
" " 1 year ..	22	13	6	17
" " 2 years ..	7	5	3	10
" " 3 years ..	4	3	..	4
" " 4 years ..	1	2	..	..
" " 5 years ..	..	3	2	4
" " 6 years ..	2	13	..	6
" " 7 years ..	..	1	..	..
Total cases : 216 ..	82	44	40	50

From a study of the table it will be seen that in spite of the comparatively short period of treatment a considerable number of the patients were clinically well and able to work years after the treatment was begun, and that quite a few are known to be in a clinically healthy condition, living a normal life, even up to six years later, that is, at least three years after the pneumothorax treatment had stopped. In this connection it is worth while to mention that E. Rist records 51

cases among his patients who were under treatment for only a comparatively short time, "who turned out quite surprisingly well, as if the process of healing initiated by a temporary collapse went on despite its interruption." (4)

THE INFLUENCE OF EFFUSION IN THE PLEURAL CAVITY.

The question of appearance of effusion in the pleural cavity during the course of pneumothorax treatment and its influence on the ultimate results has been much discussed. Some observers consider this complication detrimental to the best progress of the patient, while others with equally great authority consider fluid without any such influence. The percentage of patients showing fluid varies very much in the different statistics, most of the observers recording 40 to 50 per cent. of patients with effusion, while a few have a smaller number and others higher, even as high a number as 75 per cent. We have among our 216 patients had effusion in 43.5 per cent. Of the patients recorded as clinically well 42.4 per cent. have had pleural effusion. This number being practically identical with that for all our patients treated supports the view that effusion is of little consequence for the ultimate result.

In those cases where the clinical symptoms indicated aspiration of the fluid, we have never observed any empyema, by microscopical or cultural examination of the fluid. The aspiration has always been made with simultaneous insufflation of air which makes the operation without discomfort to the patient. The chief objection to effusion is the great risk of adhesions being formed below the fluid and the collapse thereby being reduced in efficiency.

THE DANGER OF PNEUMOTHORAX TREATMENT.

The danger of pneumothorax operation is not to be considered too lightly, although the present improved technique has much reduced it. The number of sudden deaths during the operation is in the West considered to be 1 in 1,000 to 1 in 1,500 of operations, (5) including the refills where after all the most accidents happen. (6) There is still much difference of opinion regarding the cause of the sudden deaths whether they are due to air-embolism or to pleural shock, a nervous reaction to the penetration of the pleura. This question has not been solved yet. That air-embolism can occur without air being let in from the apparatus is proved by the finding of air-emboli post-mortem in some cases where no air was given before the accident occurred. The explanation is that the needle has penetrated a vein in the lung and this vein being kept rigidly open by surrounding inflammatory tissue does not close, but because of its natural negative pressure sucks in air from the lung alveoli, or from the air already in the pleural cavity from previous insufflation. By following strictly the detailed and improved technique of Saugman, which we have had the privilege of learning from himself, we have up till now seen alarming symptoms in only two cases out of almost 4,000 insufflations

including the refills, and these patients quickly recovered. The other recorded unfortunate symptoms of convulsions, hemiplegia, and paralysis we have never observed. We conclude with Lillingston (7) that the only effective "treatment" of these unfortunate complications is of course the prophylaxis, which consists in a meticulous attention to the details of technique.

THE AMOUNT OF PRESSURE.

The amount of air injected is usually for the first insufflation 300 c.c. if this amount will allow the pressure in the pleural cavity still to be negative. Otherwise a smaller amount is given. The next refill is given the following day and after that time one day is added to the interval between the refills. The great controversy which existed during the first years of artificial pneumothorax treatment as to whether the collapse should be made with as large refills as possible even up to 1,500 c.c. or more, leaving a positive pressure in the pleural cavity, has now practically ceased. Most workers now use smaller refills and attempt to induce a complete collapse under as low a pressure as possible.

THE SEDIMENTATION TEST AS A GUIDE.

We have a modern guide to judge the efficiency of the produced collapse in the sedimentation test. It is not possible here to go into details regarding the value of this test in the treatment with artificial pneumothorax. Those who would like further information on this question with regard to Indian patients are referred to an article by us in "Tubercle." (8) It will suffice here to mention that further research with the test in 66 cases in whom the sedimentation test was made before and after treatment with artificial pneumothorax confirms the figures, giving the percentage of the fall of the red blood corpuscles as decreasing rapidly, sometimes even to normal, in cases of complete collapse. Absence of such fall indicates a partial collapse or the appearance of active lesions in the contralateral lung or other complications interfering with the good progress of the patient.

SUMMARY.

1. 306 patients have been treated with artificial pneumothorax of whom more than 90 per cent. were very advanced cases. In 90 adhesions totally prevented insufflation of air and of these 10 per cent. became clinically well.

124 patients were treated with artificial pneumothorax less than six months and of these only 7 per cent. became clinically well.

92 patients were treated more than six months and of these 44.5 per cent. became clinically well and able to work.

2. Of the 92 patients treated for more than six months 35 had a partial pneumothorax and 57 a complete. Of these 57 patients 58 per cent. became clinically well, a percentage closely approximating to the figures for the I and II stage patients who have had no need of pneumothorax.

Of the patients with partial pneumothorax only 23 per cent. are clinically well.

3. The duration of the treatment was in no case more than 3 years, and in only 6 cases over 2 years, yet a number of such patients are living and working even six years after treatment was begun.

4. In almost 4,000 insufflations no sudden deaths occurred during the operation. Two patients only showed passing alarming symptoms. No patients showed distressing complications as reported by other workers.

5. Effusion appeared in 43.5 per cent. of the cases in which air was insufflated, but this complication seems to be of little consequence as regards prognosis.

6. Although in India it will be a long time before patients in any number will be able to continue artificial pneumothorax treatment after leaving the institution in which it was begun, yet a shorter treatment is of value, for we find that of those patients who receive from six months to two years treatment with pneumothorax, 44.5 per cent. are well and able to work, while of similar patients not treated with pneumothorax only from 7 to 10 per cent. obtain equal results.

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STOCK SOLUTIONS OF QUININE.

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Reasons why Quinine often fails:—In the *Indian Medical Gazette* of January 1907, the senior writer called attention to the frequency with which patients failed to receive the doses of

quinine which were prescribed for them. Two reasons were given, (1) the patients themselves often object to the drug and fail to take it, although they may pretend that they are doing so; (2) stock mixtures in dispensaries are often under the stated strength and fraudulent misappropriation of quinine has to be guarded against.

Many other medical men have repeatedly pointed out the fallacies connected with quinine administration but yet the two-fold fraud continues, fraud on the part of the patients and fraud or carelessness on the part of compounders.

Many observations on the clinical action of quinine are utterly vitiated because the investigators have assumed that writing a prescription or giving an order constitute evidence of the administration of the stated amounts of quinine. The truth is that we have no assurance that quinine has been taken unless we have actually seen the mixture made up and administered. When strict precautions are taken "quinine resistance" becomes so rare as to be almost negligible.

This note has been prepared with a view to discovering to what extent variations occur in

the solutions of quinine or cinchona febrifuge. The quantitative estimations were carried out by taking a known volume of the mixture, making it alkaline with ammonia or caustic soda, and extracting the alkaloid with a mixture of chloroform and ether. The residual alkaloid was dried to a constant weight and the weight of the salt calculated from the base thus obtained. The results which appeared abnormal were always checked by duplicate analyses.

The dispensaries from which the stock solutions were taken are not likely to be worse than the average; they were under the charge of medical men who readily agreed to co-operate in carrying out the tests, whereas several other medical men who were approached showed a decided reluctance to help in the enquiry.

The samples were taken without previous notice having been given, but it is possible that some of the dispensaries may have been on their guard owing to having received information that samples had been taken from other dispensaries in the neighbourhood.

TABLE I.

Showing the Prescribed Strengths of the Stock Solutions and the Actual Strengths as found by Accurate Quantitative Analysis.

No.	Nature of the mixture.	Quantity of alkaloid according to the prescription in grains.	Actual quantity found by analysis.	Source.
1	Quinine sulph. mixture	1.5	1.15	Public Hospital.
2	Quinine sulph. mixture	5	4.69	Ditto.
3	Mist. cinchonine mixture	5	1.76	Ditto.
4	Quinine sulph. mixture	5	5.86	Tea Estate Dispensary.
5	Quinine sulph. mixture	5	4.11	Ditto.
6	Quinine sulph. mixture	5	5.15	Ditto.
7	Quinine sulph. mixture	5	3.75	Ditto.
8	Quinine sulph. mixture	10	7.3	Ditto.
9	Quinine hydrochloride mixture	10	2.56	Ditto.
10	Quinine hydrochloride mixture	5	4.63	Ditto.
11	Quinine hydrochloride mixture	10	1.84	Ditto.
12	Quinine hydrochloride mixture	5	4.13	Ditto.
13	Quinine sulph. mixture	15	15.09	Ditto.
14	Quinine sulph. mixture	5	4.48	Ditto.
15	Quinine sulph. mixture	10	9.3	Ditto.
16	Quinine sulph. mixture	10	9.7	Ditto.
17	Liquid quinine	10	6.1	Ditto.
18	Quinine mixture	5	9.88	Ditto.
19	Quinine sulph. mixture	10	6.41	Ditto.
20	Quinine sulph. mixture	5	3.8	Ditto.
21	Quinine sulph. mixture	10	7.52	Ditto.
22	Quinine sulph. mixture	10	9.4	Ditto.
23	Cinchona mixture	10	7.65	Ditto.
24	Cinchona febrifuge mixture	10	9.07	Ditto.
25	Quinine sulph. mixture	8	6.46	Ditto.
26	Cinchona febrifuge mixture	5	4.26	Ditto.
27	Cinchona febrifuge mixture	10	17.37	Ditto.
28	Quinine solution	3.6	3.81	Ditto.
29	Quinine mixture	10	9.52	Ditto.
30	Quinine solution	7.5	8.18	Ditto.
31	Quinine mixture	6	0.42	Ditto.
32	Quinine mixture	10	4.82	Ditto.
33	Quinine mixture	5	4.52	Ditto.
34	Quinine mixture	3.5	1.85	Tea Estate Hospital.
35	Quinine mixture	15	14.84	Ditto.

TABLE I.—Contd.

No.	Nature of the mixture.	Quantity of alkaloid according to the prescription in grains.	Actual quantity found by analysis.	Source.
36	Quinine mixture	15	13.125	Tea Estate Hospital.
37	Quinine mixture	15	10.66	Ditto.
38	Cinchona mixture	15	15.38	Ditto.
39	Quinine mixture	15	9.38	Ditto.
40	Quinine mixture	15	5.36	Ditto.
41	Quinine mixture	Data not given.	21.52	Ditto.
42	Quinine mixture	15	9.41	Ditto.
43	Quinine mixture	15	14.81	Ditto.
44	Quinine mixture	5	7.5	Mining Dispensary.
45	Quinine mixture	5	5.5	Ditto.
46	Mist. quinine sulph.	5	5.61	Ditto.
47	Quinine mist.	5	6.2	Ditto.
48	Quinine mist.	5	5.83	Tea Estate Hospital.
49	Quinine sulph. mixture	5	5.27	Ditto.
50	Quinine sulph. mixture	10	10.53	Ditto.
51	Mist. quinine	5	6.5	Ditto.
52	Mist. quinine	10	13.0	Ditto.
53	Quinine mixture	5	3.75	Ditto.
54	Mist. quinine	5	4.94	Ditto.
55	Mist. quinine sulph.	10	10.12.	Ditto.
56	Cinchona febrifuge mixture	8	7.05	Ditto.
57	Mist. cinchona febrifuge	5	4.88	Ditto.
58	Cinchona febrifuge mixture	10	10.07	Ditto.
59	Mist. cinchona febrifuge	10	10	Ditto.
60	Mist. cinchona febrifuge	10	10.68	Ditto.
61	Mist. cinchona febrifuge	10	10.2	Ditto.
62	Cinchona febrifuge mixture	10	7.11	Ditto.
63	Mist. cinchona febrifuge	5	4.65	Ditto.
64	Quinine sulph.	10	7.66	Ditto.
65	Quinine sulph.	10	10.68	Ditto.
66	Quinine sulph.	5	36.81	Ditto.
67	Quinine sulph.	10	9.82	Ditto.
68	Quinine sulph.	10	11.13	Ditto.
69	Quinine sulph.	5	5.53	Ditto.
70	Quinine sulph.	10	4.69	Ditto.
71	Quinine sulph.	5	4.23	Ditto.
72	Quinine sulph.	5	5.4	Private Dispensary (Calcutta).
73	Quinine sulph.	5	5.36	Ditto.
74	Quinine sulph.	5	7.35	Ditto.
75	Quinine sulph.	5	4.3	Ditto.
76	Quinine sulph.	5	5.6	Ditto.
77	Quinine sulph.	5	3.86	Ditto.
78	Cinchona febrifuge mixture	10	11.52	Public Hospital.
79	Quinine sulph.	10	4.64	Private Dispensary.
80	Quinine sulph.	10	13.56	Ditto.
81	Quinine sulph.	5	6.66	Ditto.
82	Cinchona febrifuge mixture	7.5	8.15	Ditto.
83	Cinchona febrifuge mixture	6.6	5.68	Ditto.
84	Cinchona febrifuge mixture	15	16.7	Ditto.
85	Quinine hydrochloride	7	5.36	Ditto.
86	Cinchona febrifuge	10	9.66	Ditto.
87	Quinine sulph.	7.5	9.63	Ditto.
88	Quinine sulph.	10	9.56	Ditto.
89	Cinchona mixture	10	8.40	Ditto.
90	Cinchona febrifuge mixture	12	12.43	Ditto.

TABLE II.

Showing the Stated Amount of Quinine and the Actual Amount found in Tablets.

No.	Tablets.	Quantity of alkaloid per tablet in grains.	Actual quantity found by analysis.	Source.
1	Quinine tablets	4	3.49	Post Office 1.
2	Quinine tablets	4	3.54	Do. 2.
3	Quinine tablets	4	3.53	Do. 3.
4	Quinine tablets	4	3.64	Tea Estate.
5	Quinine tablets	2	2.044	Private Manufacturer.

Comment.—Of 90 stock solutions, no less than 23 or 25.5 per cent. were 25 per cent. or more weaker than the stated strength, while 9 of these were 50 per cent. or more below the stated strength. If deficiencies of 10 per cent. or more are regarded as significant, it is found that 40 per cent. of the solutions are deficient. Eleven were 25 per cent. or more above the stated strength, two of these showing 50 per cent. or more of excess in the alkaloidal content.

Slight variations may well be ignored, but it is rather disquieting to find that a patient may be ordered ten grains of quinine and may receive only four to seven grains, even if the full quantity of stock solution is actually given and swallowed by the patient. It would be unsafe to assume that a deficiency in the stock solution is the only fallacy with quinine administration, it is just as easy to give short measure in making up the prescription as to give short weight in making up the solution.

When quinine is given as a "mass treatment" (the so-called "prophylactic" administration) there are even greater possibilities of fraud and error, and when we find that the stock solutions of the most carefully supervised dispensaries are liable to be much below the stated strength it becomes clear that the amount of quinine which is stated on the prescription bears no necessary relationship to the amount which is actually swallowed.

Method of Checking the Strength of Stock Solutions of Quinine.—Dr. O. E. McCutcheon, one of the medical men who kindly co-operated in supplying solutions for examination, enquired whether there was any rough and ready test by which the medical man could check the dispensary solutions. His enquiry stimulated the senior writer to request Dr. Ghosh and Mr. Chatterjee to work out a rough test by which it would be possible to detect any considerable variations in the strength of stock mixtures. The following test may be adopted.

Requirements:—1. A supply of long narrow test tubes of equal calibre (5 to 7 mm. diameter if possible). Wider tubes may be used but they would necessitate the use of larger amounts of the solutions. Calibrated and graduated tubes such as centrifuge tubes, are preferable if available.

2. *Reagent:*—Dissolve 20 grams of Merck's pure phosphotungstic acid in 100 c.c. of 12.5 per cent. sulphuric acid. (The dilute H_2SO_4 is made by adding 5 c.c. of B. P. concentrated sulphuric acid of 1.84 specific gravity to 50 c.c. water, cooling, and making up to 70 c.c. with more water.) It is well-known that water should not be poured into the strong sulphuric acid.

3. The stock solution which is to be tested. (This should be diluted if it contains more than 20 grains of the alkaloid in each ounce; in this case, the control solution will be diluted in the same proportion.)

4. A freshly prepared solution should be made up in one's presence, using the same amount of

quinine or cinchona febrifuge as is supposed to be present in the stock solution, the powders which are in stock in the dispensaries being employed.

5. In cases of doubt as to the purity of the powdered alkaloid in stock, another solution should be made using powders of known purity. This will serve as a control of the quality of the stock powders.

Method:—In one tube take one c.c. (or one part) of the stock solution, in another tube take exactly the same amount of the freshly prepared solution (a third tube may be used for the solution made from alkaloids of known purity). Measurement by a pipette is desirable but with reasonable care equal quantities can be measured.

To each of the tubes add 2 c.c. (or 2 parts) of the reagent and 1 c.c. (or 1 part) of water. Mix thoroughly by rolling the tubes between the hands for about a minute keeping them in a vertical position. Do not stir or shake the solutions. Allow the precipitates to settle for 2 or 3 hours and compare their heights. Any great variations will indicate the necessity for an accurate quantitative examination of the stock mixture.

If centrifuge tubes and a centrifuge are available the examination can be completed in a few minutes, but the test has been specially worked out so that it can easily be carried out with the simplest possible equipment.

The test solution ready made up can be obtained from any reliable chemist by supplying him with the formula. It keeps indefinitely. It is essential that the tubes employed should be of equal calibre and the quantity of the quinine solution in each tube must be the same. The total volume should be such as to give a 5 per cent. solution of sulphuric acid, at which the reagent acts best.

No claim of great accuracy is made for this test, but it will be found useful as a rough check of the strength of dispensary solutions. As already stated, it can also be used to detect any serious deficiencies in the purity of the powders from which the stock mixtures are made.

If all the stock mixtures which are dealt with are made up according to one or two known prescriptions, time will be saved by using these as controls instead of making up fresh solutions from the dispensary powders; but in this case there are possible fallacies to be considered, and it is desirable to carry out the test under conditions which do not admit of the introduction of errors due to the presence of unknown factors.

THE TREATMENT OF PERNICIOUS ANÆMIA BY LIVER.

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THE publication of several papers in the journals on the treatment of pernicious anæmia by liver tempts me to record the results obtained with this line of treatment in this hospital. The

treatment by liver was started in July 1927, as a result of the publication of reports of the liver treatment by Minot in the *British Medical Journal*.

The treatment adopted in these cases is as follows:—

1. Dilute hydrochloric acid up to $1\frac{1}{2}$ drachms diluted with water to be taken during and after meals.
2. Iron and arsenic by the mouth.
3. Injections of "Hæmoplas" once a week.
4. Liver extract ($1\frac{1}{2}$ lb. of sheep's liver) daily.
5. Anthelmintics in some cases, specially for hookworm.

The cases treated were almost all females with anæmia and pregnancy. Blood counts were made and if there was marked anisocytosis with tendency to megalocytes and high colour index with or without nucleated cells, they were classed as pernicious anæmia. Generally, nucleated red blood cells were found in these cases. The majority of them had glossitis at one time or other, and in some cases the lemon yellow tint was very marked.

There was marked improvement in all cases except two. The patient's blood count and general health improved very much and they had a good colour before leaving the hospital.

Out of 57 cases of pregnancy complicated with anæmia admitted here from July 1927 to the end of December 1927, 13 were of pernicious anæmia type. Unfortunately, the complete records of all these cases are not available.

Pernicious Anæmia following Sprue.—A medical student from Bombay was admitted to this hospital for anæmia. He had bilateral parotitis, stomatitis, and then developed a typical attack of sprue in November 1927 and was treated in Bombay for this complaint. Gradually he developed anæmia, and when I saw him he had a lemon yellow tint, glossitis, and intense anæmia. The blood showed marked anisocytosis, poikilocytosis; megalocytes were present and showed a tendency to preponderance. A few nucleated red blood cells were present. The colour index was high. There was glossitis. He was also complaining of offensive stools which were rather bulky at times. He was put on the general treatment which is being adopted in this hospital for pernicious anæmia, viz., dilute hydrochloric acid, liver extract, iron and arsenic, and hæmoplas injections. In addition, he was given calcium and parathyroid by the mouth for his sprue.

The blood counts were as under:—

Blood on 8th January, 1928, showed anisocytosis, poikilocytosis, nucleated red cells, with megalocytes present.

Red blood cells 1,500,000.	Hæmoglobin 40%
Colour Index 1.3	White blood cells.
	Polymorphocytes 65%
	Lymphocytes 32%
	Eosinophiles 2%
	Transitionals 1%

1st February, 1928.—Colour Index 1.25. Hæmoglobin 70 per cent. Red blood cells 28,000,000. Nucleated cells were not seen.

22nd February, 1928.—Colour Index 1.3. Hæmoglobin 90 per cent. Red blood cells 3,500,000. No nucleated red cells were seen.

11th March, 1928.

Red blood cells	.. 3,481,500
White blood cells	.. 6,500
Hæmoglobin	.. 85 per cent.
Colour Index	.. 1.25

Anisocytosis, Poikilocytes, very few; no nucleated red cells.

Weight 106 lbs., colour, good.

25th March, 1928.

Red blood cells	.. 4,550,000
White blood cells	.. 4,375
Hæmoglobin	.. 90 per cent.
Colour Index	.. 1.0

Anisocytosis, not marked. Poikilocytes, very few. No nucleated red cells.

Weight 109 lbs.

Hæmoplas injections were stopped on 22nd February, 1928, and the patient was getting liver extract; dilute hydrochloric acid and iron and arsenic mixture.

He developed glossitis while under treatment. It disappeared in about a week. When the patient left the hospital, he was much improved and had a good colour. He is still under treatment as an outpatient and is under observation.

The sequence of sprue followed by anæmia of a pernicious type was met with in some cases seen in Devalali, a cantonment station about 130 miles from Bombay. All the cases seem to have commenced their illness while in Bombay. In the majority of cases the symptoms started with gastro-intestinal disturbances resembling sprue. Some of these cases occurred in men who led a very active healthy life but who had to stay in Bombay for a few months by turns, coming back to Devalali on completion of their tour of duty.

Invariably they attributed the onset of disease to their stay in Bombay, where they first noticed their illness. I have not got any notes about these cases, but I remember the case of one lady, who was living in Bombay and who was ordered a change to Devalali for the benefit of her health. In the beginning she had sprue, followed later on by intense anæmia. Her blood count, as far as I can remember now, showed a high colour index. There were poikilocytosis, megalocytes and a few nucleated red blood cells. She was put on dilute hydrochloric acid with Hæmoplas injections; whey and yeast and arsenic by the mouth. When last, I saw her, the colour index had gone below 1, and her general health had improved very much.

The reason for employing Hæmoplas was that Hæmoplas is said to be a suspension or extract of "sanguine globules" (red blood cells).

Though I do not remember correctly, I think it was Lawrence, who about three or four years back published a paper in the *British Medical Journal* showing that the injections of the substance he prepared from the blood of an ox—red blood cells?—induced a higher blood count. Hæmoplas, a preparation by the Anglo-French Drug Company, was on the market and was said to contain sheep's corpuscles in suspension. It was therefore thought in view of Lawrence's work that the injection of this preparation would be beneficial, and the results obtained have been very encouraging.

In the *British Medical Journal* of February 4th, 1928, in the article on treatment of pernicious

anæmia with liver by Dr. Brewer and Fraser, it is remarked that:—"The similarity of pernicious anæmia in many of its symptoms and signs to pellagra, sprue or beri-beri, suggested that, like these diseases, pernicious anæmia might be associated with a faulty diet."

The onset of anæmia in these cases after a sprue-like disorder is of interest. Further, in the case of the medical student, the attack of bilateral parotitis (? mumps) might suggest septic infection as being one of the causes which may have caused anæmia of the pernicious type, since it is considered that septic poisoning and absorption play some part in the causation of anæmia of this type.

*PLASMOCHIN AS COMPARED TO QUININE IN THE TREATMENT OF MALARIA.

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In the August 1927 issue of the *Indian Medical Gazette*, the place of Plasmochin in the treatment of malaria has been ably discussed. Some ground has however been left uncovered, and I propose to supplement the above article by giving the results of my independent clinical investigations,

(4) and intractable cases that fail to respond to quinine.

It is an admitted fact that quinine causes leucopenia. In pneumonia however leucopenia is the very thing to be avoided, in fact the present-day treatment of pneumonia is centering round leucocytosis. Thus the practitioner is confronted with a problem, not easy of solution, when his patient develops pneumonia complicated with malaria. In India, where malaria is so prevalent, and a concurrent pneumonia not uncommon, the question assumes special importance. The opinions of doctors differ with regard to the administration of quinine in pneumonia. Some from fear of leucopenia avoid quinine altogether. Some on the other hand give full doses, considering the cure of malaria more important, while others work between these two extremes. This can scarcely be regarded as a satisfactory state of affairs. I therefore tried to see if one could come to a conclusion on the subject after careful observation of the results of the working of drugs tried for malaria.

I selected two cases of lobar pneumonia complicated with benign tertian malaria. I took their leucocyte count and put one on Plasmochin and the other on quinine. After three days' treatment I took their count with the following results:—

Name.	Disease.	W. B. C. count before treatment.	Treatment.	Result after 3 days' treatment.
Ilakimali	Pneumonia with benign tertian malaria.	6,250 per c.cm.	Quinine sulph. gr. xx per day. 2 injections of sodium nucleinate.	W. B. C. 5,500 <i>P. vivax</i> present.
Bilawar	do	6,500 per c. cm.	Plasmochin 0.06 gm. per day. 2 injections of sodium nucleinate.	W. B. C. 11,000; no <i>P. vivax</i> .

with a view to showing the effect of Plasmochin on:—

- (1) the white blood corpuscles,
- (2) gravid uterus,
- (3) patients who have an idiosyncrasy for quinine,

Then I selected two cases of malaria, both with very heavy infection, one with *P. vivax* and the other with *P. falciparum* and put the former on Plasmochin and the latter on Plasmochin Co. (tablet 1 t.i.d.). Their total counts were taken before the treatment was started and then daily during treatment, with the following results:—

Name.	Day of treatment.	Treatment received (Total).	Species of parasites.	W. B. C. count.
Mushtakhan .. ..	.. ..	Nil.	<i>P. vivax</i> +++ <i>P. falciparum</i> few.	6,875 per c.mm.
	First	0.06 gms. Plasmochin.	<i>P. vivax</i> and <i>P. falciparum</i> equal.	6,625 " "
	Second	0.12 gms. Plasmochin.	<i>P. vivax</i> few. <i>P. falciparum</i> more prominent.	6,562 " "
	Third	0.18 gms. Plasmochin.	<i>P. vivax</i> nil. <i>P. falciparum</i> present.	7,125 " "
	Fourth	0.24 gms. Plasmochin.	<i>P. vivax</i> nil. <i>P. falciparum</i> present.	7,500 " "

Name	Day of treatment.	Treatment received (Total).	Species of parasites.	W. B. C. count.
Mauriram ..	Fifth ..	0.24 gms. Plasmochin & Plasmochin Co. 3 tablets.	No parasites seen ..	7,187 per c.mm.
	Sixth ..	Plasmochin 0.24 gms. & Co. 3 tablets. Quinine sulph. gr. 40 orally	No parasites seen ..	4,375 „ „
	First	Nil.	<i>P. falciparum</i> ..	6,562 „ „
	Second ..	Plasmochin Co. 3 tablets.	<i>P. falciparum</i> disin- tegrating.	6,093 „ „
	Third ..	Plasmochin Co. 6 tablets.	<i>P. falciparum</i> very few.	6,875 „ „
	Fourth ..	Plasmochin Co. 9 tablets.	No parasites seen ..	6,562 „ „
	Fourth ..	Plasmochin Co. 9 tablets and quinine gr. 40 orally.	No parasites seen ..	4,781 „ „

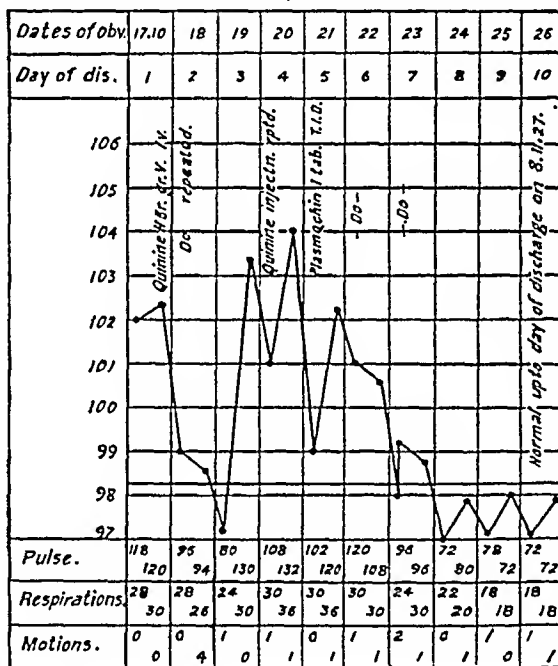
As sodium nucleinate injections raise the leucocyte count in pneumonia they were given in the first two cases quoted above. The result as shown above, was a good rise in the second case in which the action of the drug does not seem to have been counteracted by Plasmochin which was also administered with it; where as the rise in the first case was only slight, due perhaps to the drug having been counteracted by the leucopenic effect of quinine, although it is possible that this may even be due to the individual case. In the two cases of malaria referred to above, Plasmochin appears to have definitely prevented leucopenia.

Further, in all these cases in which Plasmochin was used, no cyanosis or any other untoward symptom was noticed. It is thus manifest that in Plasmochin we have a drug with great potentialities. The cases quoted are no doubt too few for generalization, but they indicate at any rate the lines on which further investigations may usefully be made.

It may be remarked that red cell counts were also taken in the above cases but no untoward effect was noticed. One case of subtertian malaria (temperature chart No. 1) even showed an increase in them, as may be seen from the following table:—

Corps, 41.H.C. No...426.

Name... N.O. Kidar Singh. Age... 34. Service... 14
Disease... Malaria B.T. relapse. Date of Adm... 17.10.27.



No. 7432 Sepoy Luxman 2/4th Bombay Grenadiers (K. E. O.).

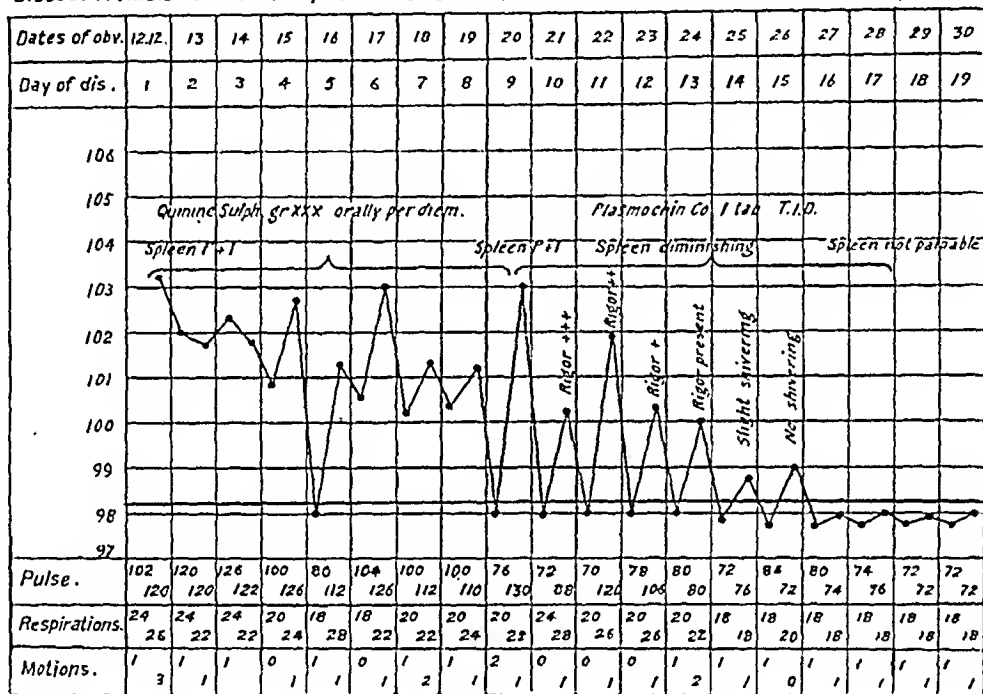
Day of treatment.	Treatment received.	Total R. B. C. count.	Parasites.
Nil ..	Nil ..	4,675,000	<i>P. falciparum</i> present.
1st ..	3 tablets Plasmochin Co. ..	4,533,333	Do.
2nd ..	6 tablets Plasmochin Co. ..	4,800,000	Do.
3rd ..	9 tablets Plasmochin Co. ..	5,000,000	Do.
4th ..	12 tablets Plasmochin Co. ..	4,600,000	Do.
5th ..	15 tablets Plasmochin Co. ..	4,500,000	Do.
6th ..	18 tablets Plasmochin Co. ..	4,750,000	No parasites seen.
8th ..	24 tablets Plasmochin Co. ..	5,500,000	Do.

The stimulating effect of quinine on the gravid uterus is well known and one is faced with a difficulty when a patient, resisting even small doses of quinine, reports for treatment. I had two such cases. One of these had been treated with two intravenous injections of quinine in Quetta and although her fever was suspended, on that account, had left headache behind it. Seven days later she got fever again, and it was then that I saw her first. On examination mixed *P. vivax* and *P. falciparum* infection was found in her blood. She would not take quinine. I put her on Plasmochin 1 tablet t.i.d. for the first three days, followed by Plasmochin Co. 1 tablet t.i.d.

injections were given, but malaria parasites were still found present. She was therefore put on stovarsol 2 tablets (gr. 4 each) t.i.d. and took in all 72 tablets at intervals. The fever subsided, but relapses occurred. She was then put on Esanophene, but since the small quantity of quinine in one pill of this compound brought back the above symptoms, this was also stopped. She was next put on a course of methylene blue. Seven grains of this were given in 1 grain doses. With this the fever subsided, but parasites were still found present. She was then given Plasmochin, which showed no untoward effect. She has now no parasites in her blood.

I may also quote the following three interesting cases in one of which (temperature chart No. II) Plasmochin proved a life saviour.

Corps...2/4th B. Grenadiers. No...7432 Name...Sep. Luxman. Age...18. Service...3/4
Disease...Malaria M.T. relapse. Date of Admission...12.12.27. Date of Discharge...5.1.28.



for seven days, after which her blood was found to have been sterilized of malarial infection. The treatment produced no untoward result. Seven days later she was safely delivered of a baby.

Other cases which give the doctor a most anxious time are those which have an idiosyncrasy for quinine and cannot stand even fractional doses of any quinine salt. I had two such cases last year but the one I mention below is the most susceptible patient I have ever come across:

Mrs. P. started malaria for the first time in this station last year. She could not stand even 1/10th gr. of quinine. The symptoms which were noticed after the administration of over 1 grain doses of quinine were (1) intense itching over the whole body, (2) urticaria, (3) redness of the whole skin and buccal mucous membrane, (4) abdominal pain, (5) diarrhoea, (6) hoarse voice and choking sensation in her throat, and (7) menorrhagia. Her blood on examination was found positive although she had taken 510 grains (34 gms.) of quinine sulphate orally. Whenever she had a severe attack of fever with vomiting, she was given sulpharsenol 0.48 gm. by injection, on which the intensity of the attack usually subsided. Four such

No. 426 N. Orderly Kidar Singh who had a previous history of severe malaria on 7th September, 1927, for which he had been put on post-hospital course of quinine, suffered on 17th October, 1927, from an attack of fever with rigor and vomiting. His blood showed *P. vivax* infection. He was taken into hospital the same day, treated with quinine hydrobromide gr. v injected intravenously at once, and thirty grains of quinine sulphate were prescribed orally per diem. The next day the injection was repeated. The temperature dropped to normal in the morning, but shot up to 103.4°F. in the evening. The 3rd injection was given on 20th October, 1927, but there was no relief and the temperature went up to 104°F. Quinine was continued orally but it failed hopelessly, the number of parasites being more numerous than before and the patient's condition became serious. On 21st October, 1927, he was put on Plasmochin 1 tablet t.i.d. After this treatment was continued for 3 days, the effect was striking, as the temperature chart shows. No more Plasmochin was given as it had run short in this hospital.

The two other cases were of more or less chronic variety. One was a European patient who was treated in Lahore with intravenous quinine, but was only temporarily relieved. When she came to Pishin *P. vivax* was found in her blood and she was getting fever

irregularly, in spite of Esanophele. She could not take quinine for long, therefore Plasmochin was started on 23rd October, 1927, she has had no fever so far since. The other case, Syaid Hussain, was a similar one. He had been treated with intramuscular injections of quinine on 16th October, 1927, and quinine orally, but without permanent relief. When he came to Pichin on 22nd October, 1927, he developed fever and *P. vivax* was found in his blood. He was put on Plasmochin on 21st October, 1927, as quinine had failed. He has since had no fever.

In addition to the above 11 cases, 13 more of different ages were successfully treated, varying from a baby of 16 days to a person aged 60 years. No untoward effect whatsoever was noticed in any one of them.

The dose of Plasmochin for an adult was in no case more than 0.06 gramme per diem and proportionately smaller doses according to age were prescribed for the younger.

I wish before I close to express my sense of indebtedness to Colonel A. H. Safford, A.D.M.S., Baluchistan District for every help, and to my assistant, Mr. Prem Singh, I.M.D., for his willing co-operation.

UREA-STIBOL IN THE TREATMENT OF KALA-AZAR.

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SINCE the introduction of von Heyden's compound, sodium acetyl-p-amino-phenyl-stibinate or "stibacetin," which was the first aromatic compound of antimony to be used in the treatment of leishmaniasis, many aromatic compounds of antimony have been introduced. Von Heyden also introduced sodium meta-chloro-para-acetyl-amino stibinate, known as No. 471 or "stibosan," and an amine salt of p-amino-phenyl-stibinic acid known as No. 693 both of which proved to be very effective in the treatment of kala-azar. In this country Brahmachari prepared a carbamide derivative of p-amino-phenyl-stibinic acid and called it "urea-stibamine" and the Union Drug Co., of Calcutta prepared the same compound and put it on the market under the name of "stiburea." Both these preparations have been extensively used in India in the treatment of kala-azar with excellent results. Urea-stibamine has been claimed by Brahmachari to be an ammonium salt of p-carbamino-phenyl stibinic acid, though Henry has criticised and doubted the constitutional formula given to it by the discoverer. Lately J. C. Das and S. C. Bhawal have introduced an allied compound which they sent to the senior author for pharmacological tests and therapeutic trials. The substance is called "urea-stibol" and it is claimed by its authors that it is a salt of urea and p-amino-phenyl-stibinic acid and is not

p-carbamino-phenyl-stibinate of ammonia which is the chemical name for "urea-stibamine."

Mr. Nihar Ranjan Chatterjee of the Department of Chemistry, Calcutta School of Tropical Medicine and Hygiene, has already shown (unpublished) that since urea can be completely removed from urea-stibamine by prolonged washing with absolute alcohol, this substance cannot be regarded as a definite chemical compound but is probably a complex salt of urea with p-amino-phenyl-stibinic acid.

We tested the pharmacological action and toxicity of "urea-stibol" and tried it in a series of cases of kala-azar. The results of the treatment were so striking that we thought it would be worth while bringing it to the notice of the medical profession on this side of India.

Pharmacological Action and Toxicity of Urea-stibol.—"Urea-stibol" is a white hygroscopic powder, easily soluble in water forming a clear deep brown solution. With dilute hydrochloric acid this solution forms a precipitate mostly soluble in excess of the acid.

Intravenous injections of "urea-stibol" in animals give very similar reactions to those given by urea-stibamine and the other pentavalent aromatic compounds of antimony. There is a fall of systemic blood pressure and a rise of the pulmonary pressure. The blood vessels of the liver and spleen dilate, the volume of these organs shows a remarkable increase, and their rhythmic movements are greatly augmented. The respiration is only slightly stimulated.

The toxicity of several batches of "urea-stibol" was tested by us. Its lethal dose in white mice varied between 220 to 230 mgm. per kilogram body weight when administered by intravenous injection.

Clinical Trials.—We tried "urea-stibol" in fifteen cases, details of which are given in the Table.

It will be seen that in nine cases the diagnosis was made by finding leishmania in the body, and in the other five by clinical and microscopical findings. The criterion of cure in most of the cases was by the general clinical manifestations such as disappearance of fever, increase in weight, decrease in size of the spleen and improvement in the leucocyte count. In very few of these cases was spleen puncture examination done to see if there were leishmania still present. The results, so far as they go in this small series of cases, show that "urea-stibol" is an efficacious remedy in the treatment of kala-azar. In two of these cases, Nos. 1 and 2, stiburea injections had been previously given with little benefit and a course of "urea-stibol" undoubtedly produced a clinical cure. A perusal of the remark column will show that the drug given in patients with bronchitis, diarrhoea and cancrum oris with benefit; no untoward effects whatever being noticed in these cases after injections. Some of these cases have now been under observation for three or four months and have shown no signs of relapse.

Case No. 15 is interesting. He came into the hospital suffering from continuous fever lasting 23 days. He gave a strongly positive antimony test and a doubtful aldehyde reaction, but unfortunately no examination for leishmania could be made to confirm the diagnosis of kala-azar. He gave a strongly positive Wassermann reaction. The patient was put on "urea-stibol" and after three injections the temperature came down to normal; the patient went out of hospital perfectly well after a course of ten injections.

It may be stated here that intravenous injections of this compound were very well borne. In none of these series of patients were any untoward symptoms produced by the injections. The dosage is the same as that with urea-stibamine.

SUMMARY AND CONCLUSION.

(1) Intravenous injections of "urea-stibol" in animals produce the same effects as with the other pentavalent aromatic compounds of antimony.

(2) The lethal dose of "urea-stibol" in white mice is 220 to 230 mg. per kilogram when given intravenously.

(3) Fourteen cases of kala-azar were treated with intravenous injections of "urea-stibol." The drug was well borne, gave rise to no untoward effects, and the results of treatment in this small series, were in no way inferior to those with "urea-stibamine" of "stiburea."

REFERENCE.

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PATHOLOGICAL EVIDENCE BEARING ON THE INCIDENCE OF DISEASES IN BOMBAY.

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(Being an abstract of the Lord Reay lectures, 1927, delivered at the Grant Medical College, on the 24th and 25th November, 1927.)

A STUDY of incidence of disease from a statistical point of view is obviously a complex one. One of the ways to attain this end with some success is to collect together reports from all important hospitals, medical schools, and all available data bearing on this question therefrom, together with collections from the practising profession and to put it together or compare it with the statistics published periodically by public health authorities. The averages obtained by such a combination will have some obvious defects, as the hospital data will be based on accurate laboratory findings, as compared with the public health statistics which are based on less accurate material. It is a well-known fact that, in a vast country like India a few diseases are sharply localised to certain provinces only. On

the other hand other infectious diseases visit all parts of the country in an epidemic form in an almost cyclic order. For these and similar reasons an individual attempt to study the disease incidence in the whole of the country is bound to fail. It appears only possible to make individual attempts and to limit oneself to definite laboratory findings, and to study disease incidence so far as it concerns one place.

It may be interesting to note that the only available study of this kind has been carried out by Sir Leonard Rogers with regard to Calcutta, and published in the *Glasgow Medical Journal* in January 1925. I may add that I thoroughly appreciate the remark of the Editor of the *Indian Medical Gazette*, who has published extracts from the article above referred to,—“for accurate information regarding disease incidence in India we must turn to the post-mortem records of the medical colleges.”

In order therefore that uniformity in the observations may be maintained, I have precisely followed the lines adopted by Sir Leonard Rogers in his work. A copy of the tables prepared by Sir Leonard Rogers was forwarded to me by the Principal, King George's Medical College, Lucknow, in October 1925, “in order to extend the figures collected by Sir Leonard Rogers for post-mortems in Calcutta.”

The material available for this study here dates from the year 1877 and comprises records of properly recorded post-mortem examinations, numbering over six thousand.

The analysis of such a large number of post-mortems performed during a period of the last fifty years will yield, one may expect, fairly accurate results, though to the more critical some defects could be pointed out in such an analysis. In some respects the disease classification as inferred from post-mortem records may turn out to be misleading, as the hospital affiliated to this college cannot always have all cases dying in the hospital put at the disposal of the pathologist for a post-mortem examination, owing to religious and social conditions; secondly, Bombay has a separate hospital for infectious diseases belonging to the City Municipality, and hence a very small number of post-mortems are recorded here of cases of such diseases as small-pox, cholera, plague, relapsing fever, cerebro-spinal meningitis, etc., in spite of the fact that the city has had many epidemics during the years under consideration.

In the age statistics the very small number below ten years in spite of the highest mortality existing below ten years is easily explained by the fact that quite a negligible number of dead bodies of infants are available for post-mortem examination, again through religious and social obstacles.

Thus it will be clear that the records obtained in this way may not serve the purpose of giving an absolute indication of incidence of disease as responsible for death rates in a particular area,

town, or presidency, and much less for the whole country. If hospital registers recording deaths were also utilised at the same time probably the figures would be different.

At the same time the figures may be comparable with those obtained by Sir Leonard Rogers in Calcutta, working under practically similar social and religious conditions; suffice it here to set out on exactly similar lines the analysis of records collected here.

This is my reason for publishing this article.

The percentages of post-mortems in the systemic classification are liable to certain variation. The following table shows the percentages of systemic diseases of every fifth year.

Dysenteries form the largest group, nearly making up half the total. Malarial fevers form nearly a third of the total. Kala-azar is only occasionally seen in Bombay, and only amongst immigrants. The Bombay figures, it will be seen, vary widely from those for Calcutta, probably because of the exclusion of cholera and plague as infectious diseases treated elsewhere. The same reason might explain the relatively small total figure for deaths from tropical diseases in Bombay. Deficiency diseases are practically absent in these series owing to the fact that the majority of the patients admitted into the hospital are from the districts where in the ordinary course of their dietary they use fresh

		1885	1890	1895	1900	1905	1910	1915	1920	1925
Tropical diseases	..	16·8	13	14	18	13	16·5	8	7	16·8
General diseases	..	23·2	13	5	12	10	6·5	8	8	12
Tuberculosis	..	24	9	22	22·5	27·5	28·5	20	25	16·8
Circulatory	..	2·4	6	4	4·5	7	15·5	9	3	8
Respiratory	..	13·6	22	7	12	27	20	26	23	28
Digestive	..	14·4	16	9	3	2	8	6	7	3·2
Urinary	..	1·6	4	13	4·5	4·5	3·5	1	2	4
Nervous	..	6·4	8	3	7·5	4·5	4·5	9	6	6·4
Malignant	..	2·4	2	5	0	2	1·5	2	0	1·6
Remainder	..	9·6	20	21	7·5	5	10	5	5	2·4

Under some headings a great variation is seen in different years. At the same time one must note that practically in every year under consideration at least a few post-mortems on every systemic disease have been called for. Hence combining the records of a large number of years is only going to leave a negligible error, if any.

TABLE I.

Percentage of Total Mortality due to Tropical Diseases.

Disease.	6,336 Bombay Post-mortems.	1,600 Calcutta. Post-mortems
Malaria	3·12	1·56
Kala-azar	0·08	8·06
Plague	0·87	0·37
Cholera	0·32	9·69
Amœbic dysentery	4·50	5·69
Bacillary dysentery	1·31	4·12
Amœbic liver abscess	2·70	2·69
Ankylostomiasis	0·186	6·130
Beri-beri	0·13	0·37
Leprosy	0·20	..
Relapsing fever	0·26	..
TOTAL	13·80	33·43

vegetables, unboiled milk and unpolished rice. The very small number recorded have nearly always been from amongst the Japanese.

Differentiating between amœbic and bacillary dysentery from post-mortem notes has been difficult. Whenever the large bowel has been described as the seat of discrete ulcers with healthy mucous membrane between I have recorded the condition under amœbic dysentery; on the other hand a diffuse gangrenous colitis I have always counted under bacillary dysentery.

Ankylostomiasis is probably commoner than shown in the above table. The above figures refer only to such of the ankylostomiasis cases as have died of this infection.

The Bombay series also show considerable excess in general and especially tubercular disease and diseases of the respiratory system. All the other groups show a smaller percentage than in the Calcutta figures.

Anæmia shows nearly the same frequency as in the London series. Leukæmia and diabetes are very rare; tetanus and typhoid have given much higher figures than in the other two series. It is interesting to note that out of the 28 cases recorded as tetanus 24 cases were recorded between 1877

TABLE II.

Age Incidence per cent of Total Medical Post-mortems.

Percentage.	BOMBAY.		CALCUTTA		ST. MARY'S HOSPITAL, LONDON.	
	All ages.	Over ten.	All ages.	Over ten.	All ages.	Over ten.
Up to 10	0.78	....	2.5	....	16.9	....
11 to 20	10.7	10.77	13.4	13.8	10.2	12.2
21 to 30	34.2	35.1	35.3	36.3	12.1	14.6
31 to 40	28.6	29.0	27.4	28.1	12.3	14.8
41 to 50	15.8	15.9	13.3	13.7	16.5	19.9
51 to 60	7.92	8.02	5.8	6.0	20.0	24.1
Over 60	3.16	3.19	1.9	2.0	12.0	14.4
Over 50	11.0	11.22	7.7	8.0	32.0	38.5
Over 40	26.9	27.1	21.0	21.7	48.5	58.4

TABLE III.

Percentage of Deaths in the Main Groups of Diseases.

Diseases.	Bombay.	Calcutta.	London.
General	5.37	9.23	6.10
Tuberculosis ..	25.36	21.93	13.40
Circulatory ..	6.05	10.50	20.30
Respiratory ..	23.75	27.13	16.80
Digestive	8.79	12.0	7.50
Urinary	4.185	6.35	8.60
Nervous	5.502	7.41	11.9
Malignant diseases ..	1.49	4.59	13.8
Remainder	4.95	0.84	1.60

TABLE IV AND V.

Percentage of General Diseases including Tuberculosis.

Diseases.	Bombay.	Calcutta.	London.
Anæmia	1.44	2.34	1.50
Leukæmia	0.126	0.27	1.70
Diabetes	0.14	0.18	0.70
Diphtheria .. ..	..	0.18	0.50
Septicæmia	1.39	3.00	0.50
Tetanus	0.44	2.05	0.10
Typhoid	0.71	1.21	0.3
Syphilis	1.17	..	..
<i>Tuberculosis.</i>			
General	2.56	3.09	3.50
Meningitis	0.20	1.04	2.40
Pulmonary	19.30	16.10	5.40
Primary intestinal. ..	1.44	1.04	0.0
Peritonitis	0.47	0.05	0.80
Other focus ...	1.59	0.09	1.0

and 1905, only 3 between 1905 and 1924, and only 1 in 1924-26. This shows how remarkable is the effect of the antitoxin as a prophylactic measure, and how it has reduced the incidence and deaths due to tetanus in recent years. In typhoid fever we find the cases have been evenly distributed throughout the fifty years. In a good number of cases the cause of death has been put down as syphilis and the notes give ample evidence in favour of such a diagnosis, e.g., multiple gummata in the internal organs including the central nervous system; hence I have thought it desirable to put syphilis as a separate heading.

Diabetes is rarely recorded, mainly owing to the fact that the hospital admissions are mainly from the poorer classes. About a dozen cases, mostly of old standing diabetes come to the hospital in a year but leave the hospital before the fatal termination.

As regards tuberculosis one finds the same ratio as described by Sir Leonard Rogers. Pulmonary tuberculosis being the most common, forms four-fifths of the total number of deaths due to tuberculosis. On carefully going over the notes and minutely examining tissues at over 200 autopsies during the past few years I am led to think that every tuberculosis case is a chronic one with very little or no fibrosis, ending either by complications like pneumonia or by an acute dissemination of the chronic focus all over the body. The commonest mode of dissemination seems to be by the bronchial tree in either lung from a pre-existing pulmonary focus; next common most seems to be lymphatic dissemination; whilst dissemination by the vascular stream is the least common. It is further interesting to know that in spite of minute tubercles being formed all over the body the meninges especially escape. One or both tonsils have always shown a tuberculous

focus of a comparatively recent formation in every case of tuberculosis. The distal one inch of the appendix has never been seen to be the seat of tuberculous infection; the commonest place where the appendix is affected is its cæcal end. In a larger proportion of tuberculosis cases wherein intestinal lesions are seen the colon and the rectum have shown ulceration. Genito-urinary tuberculosis is comparatively rarely met with here, the museum in this college having only a dozen specimens illustrating tuberculosis of the kidney.

Other findings relating to the heading tuberculosis as recorded in Calcutta are to a great extent applicable to Bombay also.

During such periods of the year when acute pulmonary diseases like pneumonia are responsible for a large number of deaths, tuberculosis is comparatively less common as a cause of death as noticed in the post-mortem room.

TABLE VI.

Percentages of Respiratory Diseases.

	Bombay.	Calcutta.	London.
<i>Respiratory:—</i>			
Lobar pneumonia	12.91	16.03	4.2
Broncho-pneumonia.	4.74	5.80	6.1
Bronchitis ..	3.75	3.00	4.7
Pleurisy and empyema.	1.14	1.30	1.2
Others ..	1.2	1.0	0.6

Respiratory diseases appear to be responsible for one-fourth of the total number under consideration (23.75 per cent.),—a much higher figure than the percentage in the London series, being nearly one and a half times the latter. Lobar pneumonia is the commonest, whilst basal pneumonia has nearly the same incidence in all the three series.

TABLE VII.

Percentages of Circulatory Diseases.

	Bombay.	Calcutta.	London.
<i>Circulatory:—</i>			
Ulcerative endocarditis.	0.205	1.05	2.6
Rheumatic endocarditis.	0.56	0.00	3.7
Aortic valve disease.	0.93	2.73	2.6
Mitral valve disease.	1.04	0.93	4.3
Pericarditis ..	0.28	0.75	0.4
Atheroma ..	1.02	1.41	2.4
Aneurysm ..	0.79	0.59	1.1
Others ..	1.20	1.59	1.1

There are thirty-six cases recorded of rheumatic endocarditis. In the absence of a bacterio-

logical finding I would not go further in drawing conclusions. As regards valvular diseases, the affections of the mitral valve are at least equal to if not commoner than the affections of the aortic valve. Aneurysm and atheroma as a cause of death are less common in my series as compared with the Calcutta figures. Very few cases are recorded as occurring above the age of 40; the most common age incidence recorded varies between 28 and 35 years. There are extremely few instances of congenital abnormality. Syphilitic changes in the wall of a thickened or irregular aorta or in the wall of an aneurysm are very common, as seen by me in recent years. Special mention may be made of a very rare case of an aneurysm recorded in 1925. It was discovered in a male aged 28, who had been admitted into the hospital quite unconscious and who died within 36 hours of admission. It was a dissecting aneurysm commencing from the aortic orifice, extending to the bifurcation of the aorta. The orifice through which the blood had traversed had completely closed, so that the aorta was divided into a very small channel for the blood and the large aneurysmal sac, completely closed at either end.

One may not be wrong in stating that, in general terms, atheroma is met with at all ages ranging from 20 years onwards. The age incidence of valvular diseases as found in the Bombay series is chiefly between 28 and 35.

TABLE VIII.

Percentages of Digestive Diseases.

	Bombay.	Calcutta.	London.
<i>Digestive:—</i>			
Gastric and duodenal ulcers.	0.22	0.92	2.1
Enteritis ..	3.36	1.42	2.0
Cirrhosis of the Liver.	2.01	5.91	1.3
Others ..	3.19	3.75	2.1

Owing to the fact that the details about digestive disorders are less minutely recorded in the post-mortem records here, a comparative study of the different diseases must be postponed. From the total one may say that digestive diseases are equally responsible for deaths as in the London series, and less common as compared with the Calcutta series.

Post-mortems done on subjects below 10 years are so few that I am unable to say anything about gastro-intestinal disturbances in children.

The commonest type of cirrhosis of the liver seen here is the multi-lobular (alcoholic?) variety. Chronic malarial infection is observed to produce a unilobular type of cirrhosis. Syphilitic scarring of the liver is very common. Biliary cirrhosis is less common than the alcoholic. In both the

biliary and alcoholic varieties in a large proportion of the cases the death has been due directly to the cirrhotic process. Chronic or acute ulceration of the large bowel has not been observed coincident with cirrhosis of the liver. Thus from the records available here much light cannot be thrown on any newer conception of cirrhosis of the liver.

TABLE IX.

Percentages of Urinary Diseases.

	Bombay.	Calcutta.	London.
<i>Urinary:—</i>			
Parenchymatous nephritis ..	1'865	1'96	2'3
Granular kidney ..	1'185	3'46	5'4
Others ..	1'14	0'93	0'9

Kidney disease by itself as a cause of death is very rare. It is a common experience of anybody who has worked sufficiently long in the post-mortem room that the kidneys show at all autopsies parenchymatous or interstitial changes to a greater or less degree. As will be seen from the above table all forms seem to be equally responsible for death. A typically chronic parenchymatous nephritis, apart from its being a cause of death, has been only noticed by me twice in the last 600 post-mortems; and was coincident with chronic tuberculosis of the lungs; atheromatous changes in the arteries however extensive are never accompanied by interstitial changes in the kidney. Kidney disease shows the same or a slightly lower percentage as compared with the Calcutta series.

TABLE X.

Percentages of Nervous System Diseases.

	Bombay.	Calcutta.	London.
<i>Nervous:—</i>			
Meningitis ..	1'568	3'29	2'40
Apoplexy ..	2'196	1'96	6'2
Others ..	1'725	2'16	3'3

The frequency of nervous diseases is in close parallel with the Calcutta series. Pneumococcal meningitis is often seen. Streptococci have not been discovered to be the cause of meningitis even once. Meningococcal meningitis is not at all uncommon. To give a single illustration, between June 1921 and July 1922, I came across in a single ward 35 cases of meningococcal meningitis as diagnosed by examination of the cerebrospinal fluid. Certainly, out of the two, pneumococcal and meningococcal meningitis, the former is the more fatal.

TABLE XI.

Malignant Growths (Percentage) in Bombay and Calcutta Post-mortems.

	Bombay Cases 6,336	Calcutta Cases 1,600
<i>Sarcoma:—</i>		
Lympho-Sarcoma ..	5	12
Others ..	12	10
<i>Carcinoma:—</i>		
Stomach ..	13	3
Gall-bladder ..	2	10
Primary of the Liver ..	2	6
Pancreas ..	7	4
Oesophagus ..	5	0
Large bowel ..	5	2
Female genitalia ..	5	2
Breast ..	1	0
Lungs ..	39	0
Others ..	1	0
TOTAL ..	97	49

As far as one can see from the above figures, post-mortem examinations on malignant disease cases are very rare, the total percentage in the Bombay series being 1.49 as against 4.59 in the Calcutta series, and 13.8 in the London series think however, that generalisations about the frequency of the different malignant diseases may be misleading.

TABLE XII.

Incidence of Malignant and Innocent Tumours in Bombay, Calcutta and London.

In the following table are analysed a thousand tumours sectioned at the Grant Medical College, Bombay.

Innocent Tumours.	1,000 Bombay cases.	1,190 Calcutta cases.	1,000 London cases.
<i>1. Connective Tissue—</i>			
Fibroma ..	114	63.0	29
Fibro-myxoma ..	15	52.9	10
Myoma ..	3	99.1	55
Lipoma ..	23	8.4	35
Chondroma ..	1	6.7	3
Odontoma ..	3	..	..
Osteoma ..	0	4.2	2
Vascular ..	10	10.2	13
Neuro-fibromata ..	8	..	..
Total ..	177	244.5	147
<i>2. Cysts—</i>			
Ovarian and Broad Ligament ..	32	51.3	56
Breast ..	2	0.8	19
Thyroid ..	13	2.5	14
Dermoid ..	21	10.2	17
Hydatid ..	3	1.7	2
Others ..	9	26.0	22
Total ..	80	92.5	130

TABLE XII.—Contd.

Innocent Tumours.	1,000 ombay cases.	1,190 Calcutta cases.	1,000 London cases.
3. <i>Epithelial (a) Papil- loma—</i>			
Of skin ..	57	20.5	29
Of mucous mem- brane ..	6	13.4	36
Total ..	63	33.6	65
<i>Epithelial (b) Adenoma</i>			
Breast ..	16	31.9	23
Prostate ..	17	4.2	27
Thyroid ..	6	0.0	37
Others ..	26	14.3	6
Total ..	65	50.4	93
1. <i>Sarcomata</i>			
Round-celled ..	86	110.0	23
Spindle-celled ..	33	39.5	40
Polymorphic ..	16	11.3	4
Chondro-sarcoma	2	4.2	4
Osteo-sarcoma ..	3	1.7	..
Melanotic sarcoma	9	8.4	4
Lympho-sarcoma	7	8.4	11
Undifferentiated..	24	..	..
Total ..	185	184.0	91
2. <i>Epithelial (a) Squa- mous—</i>			
Skin ..	72	50.8	35
Lips ..	12	8.4	11
Cheek ..	11	10.2	8
Tongue and mouth	45	19.3	60
Jaw ..	21	18.5	9
Throat and larynx	0	3.6	20
Oesophagus ..	1	3.6	3
Penis ..	38	15.1	7
Vulva and vagina	2	5.0	4
Cervix uteri ..	21	67.2	18
Secondary in glands ..	..	..	28
Rodent ulcer ..	7	..	..
Total ..	230	201.6	208
<i>Epithelial (b) Glandular</i>			
Breast ..	91	68	152
Uterus ..	20	45.4	17
Ovary ..	8	23.5	12
Stomach ..	0	4.2	11
Liver ..	0	7.7	..
Gall bladder ..	0	5.4	3
Large intestine	9	7.6	33
Abdominal ..	4	5.1	7
Kidney and supra- renal	1	1.7	5
Prostate and testis	3	4.2	5
Others ..	64	21.0	21
Total ..	200	193.2	266
Total malignant tu- mours all forms ..	615	579.0	565
Sarcomata ..	182	184.0	91
Squamous epi- theliomata ..	230	201.6	208
Carcinomata ..	200	193.2	266
Total malignant epi- thelial ..	430	394.8	474
Total innocent tu- mours all forms ..	385	421.0	435
Total innocent epi- thelial ..	128	84.0	158

From the figures given in the tables above it will be seen that many facts referred to by Sir Leonard Rogers are borne out. The supposed immunity of the uncivilised races can well be disproved by the fact that in my series 1.49 per cent. is recorded for malignant disease in the post-mortems, as compared with 4.59 per cent. in Calcutta and 13.8 per cent. in London. My figures, however, are greatly modified by the circumstance that most of the malignant disease cases that undergo operation leave the hospital and cannot be subsequently traced, and as a rule do not return for operation for recurrence. One will not be far from right in saying that many cases must be recurring and dying outside the hospital, thus explaining the very small number of post-mortems. On the other hand the analysis of the sections examined at this college shows a close parallelism with the Calcutta figures. On an average about 100 tumours are sectioned per year up to now. This number is gradually increasing. However, these cannot be the absolute figures, as sometimes well defined benign or malignant tumours, clinically decisive, do not come to the pathologist for section. Taking into consideration this error or omission the figures given above will certainly give a fairly accurate idea of the frequency of tumours. My figures are in every respect higher than those of the Calcutta series, except for innocent tumours; relatively the total malignant tumours exceed the total innocent tumours. Squamous epithelioma and carcinoma are nearly equally common. Epithelial tumours in general exceed the connective tissue tumours by a large percentage. From the point of view of age incidence and its bearing on the occurrence of tumours in general my findings coincide with those of Sir Leonard Rogers. Tumours are seen at a comparatively early age here. The average may be put as occurring between 28 and 35 years. Cases above 50 very rarely occur. The number of tumours examined by me during the last few years is comparatively small, viz., one-third of the total number of cases examined. I have not so far gone into further details about their relations to organs, age, nationality, multiplicity and histological nature. I have already published a small paper embodying my conclusions about the incidence of primary carcinoma as it affects the liver, gall-bladder, pancreas and the stomach, in the *Indian Medical Gazette* for June 1927. I am carrying on further observations in this connection. To conclude about malignant disease affecting individual organs it will require probably many years to collect enough facts for analysis.

This paper may be taken as only a preliminary contribution to this subject, which is very vast and not likely to be completed satisfactorily in a short time, especially when the sources of the material are so complex.

Before concluding I desire to express my gratitude to the Professor of Pathology, Grant Medical College, for allowing me to carry on this

work and helping me at every stage, and to the other staff of the department for the wholehearted assistance given to me by them.

THE TREATMENT OF CHOLERA BY ACID AND CRESOL.

By F. J. PALMER, F.R.C.S.I., Lt.-Col., R.A.M.C. (retd.).

IN the *Indian Medical Gazette* for August 1924, the writer published a paper on the treatment of cholera by cresol, and on the general principles which, in his opinion, should guide one in the treatment of any case of cholera.

In the same journal for April 1925, a further paper was published on the treatment of cholera by cresol and acid. The latter treatment was then only in the tentative stage, and only a small number of cases had been treated by the method. The writer had, however, been much impressed by the results in the earlier cases treated, and has continued the same treatment, with gradual improvement of the method during the cholera seasons of 1925, 1926 and 1927.

The treatment and principles of application are exactly the same as in the paper of April 1925, but the dose of acid has been gradually and cautiously increased as experience showed that no ill effects had been produced by it in the smaller doses.

The following instructions were issued to all medical subordinates on 25th January, 1927:—

Treatment of Cholera, 1927. Standard cresol mixture m 1 in ounce of water (Sanitol brand if possible), to which acid is subsequently added. the sooner before use the better.

1 to 3 years	..	..	1 minim cresol	3 m	acid sulph.	aromat 1 oz. water.
3 to 6 "	..	..	2 "	4 m	" "	" 2 " "
6 to 9 "	..	..	2 "	6 m	" "	" 3 " "
9 to 12 "	..	..	3 "	8 m	" "	" 3 " "
12 to adult	..	..	4 to 5 "	10 to 15 m	" "	" 4 " "

according to age and weight.

Increased dosage according to age and size is secured by increasing the amount taken in proportion to the bowel area, and not by increasing the strength of the cresol in the mixture.

A dose every $\frac{1}{4}$ hour for 8 doses, that is 2 hours; and afterwards every $\frac{1}{2}$ hour for 4 doses, another 2 hours; making 12 doses in all spread over 4 hours.

When this period is over the acid is stopped, and the cresol alone given hourly, unless there is a further tendency of the pulse to fail, or failure for a second time of a returning one, when it may be given again for a few doses. It may also be resumed for a few doses if further diarrhoea occurs, and the motions are found to be alkaline to litmus paper.

Second day, or after 24 hours, cresol 2 hourly.

Third day, or after 48 hours, cresol 3 hourly.

Any tendency to relapse on the second or third day, which is rare, to be met by addition of acid for a few doses.

If vomiting or retching constant, give for adults Tinct. Opii m 20 or 25, or Tinct. Chloroformi et Morphine Co. m 15 to enable mixture of acid and cresol to be retained.

Opium is sometimes useful in the restlessness of late cases, to induce sleep, lessen vomiting and retching, etc., but should not be given, if possible, until there is evidence that the bowel has been completely emptied, and, even then, only in very special cases.

Plenty of tepid water to be given early between the doses of acid and cresol mixture. At this stage there is a good deal of thirst, and it is easy to induce patients to swallow fluid; later it is often very difficult. The head should always be slightly lifted by the left palm when administering fluid or medicine, and a feeding cup used. Neglect of this precaution may lead to a fatal issue at times, from fluid entering the lung.

In my experience in dealing with Indians this small point requires constant stressing and repetition, and I have often had to check attendants from pouring medicine or fluid into the open mouth of a recumbent, collapsed, and sometimes almost senseless, patient.

In dry cholera cases with one or two attacks of vomiting, early purging, and rapid collapse, an injection of pituitrin may be given and if this does not quickly produce evacuations, Tabloid elaterin (four tabloids, gr. 1/40, B. W. & Co. for an adult), or 5 grains of calomel may be given. The writer has not so far had any opportunity of testing this plan.

Stimulation by adrenalin and camphor in severe cases, as already laid down, and general principles to be followed.

For the benefit of those who have not seen my paper of August 1924, I quote the following paragraph from it.

"During the stage of collapse, three to eight minims of solution of adrenalin chloride, 1 in 1,000, may be given hypodermically or intramuscularly every two hours, or slightly more often. In marked cases of collapse camphor, one-quarter to one grain, according to age, may be given in a similar manner. In most cases in an adult, however, I prefer to give half a grain of camphor and repeat in half an hour if necessary, no further dose to be given under two hours."

I am rather loath to introduce large doses of any stimulant, no matter how desirable otherwise, in a patient whose kidney function is in abeyance, and rarely give more than three doses

of either stimulant. Experience has seemed to show that cases receiving repeated doses of adrenalin have not done as well as those receiving only a few. This may of course be due to the fact that only the most severe cases were so treated, but it may be due to the fact that relaxed vessels offer less resistance to blood passage and so conserve heart energy.

The quality of the cresol used is of importance. I quote from my first paper on this subject. "Some of these preparations I have seen are highly unsuited for internal use, and seem to me to consist chiefly of crude carbolic acid. It is stated that para-cresol is a powerful poison. A good variety of cresol for internal use should be thoroughly miscible with cold water, producing an emulsion resembling much watered milk. No globules, however minute, of tarry fluid should remain in suspension, this being generally a characteristic of the inferior brands. The preparation, in other words, should make a perfect emulsion. It should have a slight, not unduly pungent, tarry taste, but should not taste at all of carbolic acid."

"Preparations forming a thin watery, very slightly milky fluid, should not be used internally. These are generally of the crude carbolic type."

The acid should be added to the cresol solution immediately, or as shortly before use as possible, to prevent separation out of the cresol. I have tested many brands of cresol in this manner by adding acid, and the one which results in least separation of tarry particles, even after some interval has elapsed, is "Sanitol" a preparation sold by Frank Ross and Co., Calcutta. (Usual disclaimer.) This I have found preferable to any brand yet tried. I should hazard the guess that the resistance of this emulsion to acid is possibly due to the fact that it has been emulsified with some resin. Particles emulsified by soap or alkali would more quickly run together on addition of acid.

So far 167 cases have been treated by this method during the past three years, with 134 recoveries and 33 deaths, a mortality of 19.7 per cent.

During the past year, with the acid dosage as now laid down, there were 27 cases with 5 deaths, a mortality of 18.5 per cent. Two of these cases had received two doses of vaccine a short time before, and one had been inoculated once. All three recovered, a fact of little significance in view of the Madras figures for 1926, and the writer's personal experience.

There were 9 completely pulseless cases when first seen, of which 4 died, a mortality of 44.4 per cent, and 12 semi-collapsed cases of which one died. It is doubtful if this one is rightly placed, for the writer has on several occasions seen one of his subordinates report a pulse in a case in which the most painstaking personal examination failed to detect one. In such cases the

pulse in the observer's finger tips, intensely anxious to detect the faintest impression, is mistaken for that of the patient.

One of the fatal cases had a hæmoglobin index of 30 per cent, and was being treated for anæmia when cholera supervened. Another had been ill for 24 hours, and was only seen an hour before death. In a third case pulse and urine had returned, but the child died next day with symptoms suggestive of perforation. Inquiry elicited the fact that it had suffered from a quinine-resistant fever for a week before the onset of cholera, probably enteric. I mention these to show that the results as regards cholera are even better than they seem, and to show that no "cooking" of results has taken place. On the garden on which the writer resides there have been in 1927 seven cases with one death, and that the anæmia case above referred to.

The writer has used the above treatment, slightly modified according to the severity of the case, for bacillary dysentery for the past three years, and considers it at least equal, if not superior, to any other at present in vogue.

In the case of a severe infection the doses should be given at least half hourly for six or eight doses, and thereafter hourly for the first 24 hours, being continued two hourly and three hourly for the second and third days respectively. Administration should then be stopped. The guiding idea is that if the specific bacilli can be hindered in their rapid multiplication at an early stage, necrosis of the mucous membrane will not take place to any great extent, and time will be given for the production of natural protective substances.

Administration is stopped at the end of three days to counteract any tendency towards the evolution of a cresol and acid-"fast" organism in the progeny of those bacilli which may survive the early intensive treatment. Any tendency to relapse which may then occur can be dealt with by the original method of attack with more hope of success.

In initially milder cases it will not be necessary to give the doses as frequently as in the more severe types.

A similar mixture is the routine method of treating diarrhoea on all the gardens of which I have charge. It seems efficacious, possibly lessens the number of carriers, and many intestinal worms have been reported to me as expelled after its use.

Some sixteen years ago the writer first used cresol lavage in a case of sprue, steadily going to the bad, on which he had performed appendicostomy for the purpose. The result was complete cure. That was long before I had dreamed of oral administration. In the past few years I have treated two cases of typical sprue with acid and cresol with complete success. In a third case it failed, but certainly seems worth a trial.

Indian Medical Gazette.

MAY.

HOOKWORM INFECTION IN INDIA.

AN exceedingly important memoir on hookworm infection in India is that by Dr. Asa C. Chandler in the January 1928 number of the *Indian Journal of Medical Research* (Vol. XV, No. 3, p. 695). As only a few of our readers see that journal, perhaps we may be excused for reviewing this contribution to an important subject at length. Dr. Chandler has been working for the last three years at the Calcutta School of Tropical Medicine under the grant from the Indian Jute Mills Association, his research work also being partly financed by the Indian Research Fund Association, and his recent appointment to the Rice Institute in Texas robs India of one of her keenest and most enthusiastic research workers.

Method of Investigation.—The campaign was planned to cover the whole of India and Burma with a view to determining the extent and severity of hookworm infestation in this country, and its importance in medical practice in India. The procedure adopted for each province was as follows. The *Gazetteer* was first carefully studied with regard to the climatic and physical features, etc., of the province, and certain rural districts and towns were picked out as being most typical of the province. The local authorities were then communicated with, and in most instances gave very valuable and enthusiastic help to the enquiry. An advance party then left Calcutta to visit in turn each selected centre or rural area. Field men were sent out and distributed slips of paper with the age, caste, and sex of the individuals concerned, persons of all ages and castes and of both sexes being taken. These individuals were instructed to place the slip of paper beside the stool when passed at the defæcation site the next morning, when sweepers, who had been especially trained for the work, collected each stool and paper in turn. In this way it was usually possible to get from 75 to 100 stools from known individuals in each village, whilst other stools from non-identified individuals were also collected from the defæcation sites.

The stools were railed to Calcutta, and on receipt were immediately placed in the refrigerator room. Each was examined by Lane's direct centrifugal flotation method, and if found to be positive egg counts were made by Stoll's dilution egg count method. Dr. Chandler is convinced that very few infections were overlooked; the ova were well preserved and very few showed signs of degeneration.

In the meantime the field party collected observations and made maps of the locality, showing relationship of defæcation areas to houses, tanks, wells, etc. Copious notes were taken in all instances of the defæcation and other habits of the

people; the water supply was carefully studied, notes taken of the types of houses and their construction. The question of soil infestation was studied on the spot and soil samples collected and railed to Calcutta. The field party visited each province in turn.

As soon as the preliminary knowledge had been gained, Dr. Chandler then made a personal visit to each area in turn to observe conditions at first hand. In this way it proved possible to make a complete survey of India and Burma within the short space of three years. Whilst he does not claim that this method is infallible, Dr. Chandler claims—with some degree of confidence—that the method does afford an index of the local infestation, by which one locality can be compared with another.

General.—India is a vast country, and every possible variety of climate is to be encountered within her borders, whilst rainfall conditions vary very widely. It was found that both the total annual amount of rain and its distribution throughout the year have an important bearing on the propagation of hookworm infections. When the total rainfall falls below 40 inches in the year, there may be a high incidence of light infections, but heavy or even moderate infections are absent or very rare, and consequently there is little or no hookworm disease. If the total rainfall is so distributed that not more than 5 or 6 inches fall in any one month, the incidence is small also, whereas in places where 9 or 10 inches fall within any one month, the incidence of infestation may reach 70 to 80 per cent. or more. The larger the number of months in the year during which the ground is kept practically continuously moist, the greater is the amount of hookworm infection which will occur. Hookworm infections are rapidly lost when re-infection is stopped; three months of dry weather appear to be sufficient to ensure a loss of about 50 per cent. of the worms harboured, 60 per cent. are lost in six months, and 65 per cent. in nine months. The consequence of this is that the time during which hookworm infection can be acquired is reduced in India from 12 months to a period varying from 2 to 8 months for different provinces. A dry season of from 6 to 8 months has practically the same effect as mass treatment would have on the population, and although throughout India hookworm infestation is excessively common, yet heavy infections are rare, and hookworm disease—as apart from infestation—is uncommon. We have been accustomed for many years to think of hookworm infection as being one of the chief scourges of India. Actually, it is apparently a relatively unimportant cause of disease in this country—except in certain specified areas.

Since it takes about six weeks after infection for the ova to begin to appear in the patient's faeces, the egg counts begin to show the effect of the new acquisitions about six weeks after the onset of the rainy season, and cease about six weeks after the dry weather has set in.

Other Epidemiological Factors.—Occupation does not play a very important part in hookworm infection in this country, since 90 per cent. of its inhabitants are rural labourers. Unlike China, where human faeces are extensively used for manure, in India human faeces are not so employed, and hence the Indian problem is a much less difficult one than the corresponding one in China. Soil pollution on the other hand is almost universal in India, since the villagers of India habitually defæcate on the surface of the ground somewhere near the villages. In the delta division of Burma, which is habitually flooded during the monsoon, latrines of a primitive type are in use by most of the inhabitants, and in some parts of Eastern Bengal primitive latrines are used by the women and children. In many parts of South India a piece of ground is set aside in the village, surrounded by low walls, for women, and is called a latrine; actually it is far more dangerous than defæcation in the open.

A curious point which comes out in the enquiry is that the normal type of stool in India is not the formed one, which is considered characteristic of European countries, but a pasty one, which is not formed. This is true of all parts of the country and of all its races. It is obvious that the more concentrated the defæcation area, the greater the danger of contact with infested ground when the area is visited. The vast majority of infections are acquired when standing or sitting on infected ground during the act of defæcation. Even the use of a raised root of a tree, or of a low horizontal branch, in so far as it is efficient in keeping the feet off polluted soil during the act of defæcation, is a powerful factor in controlling hookworm infection.

With regard to occupation, sweepers and sewage farm coolies, owing to the nature of their duties, are continuously exposed to infection, but the infections are usually mild. Tea garden coolies are especially prone to infection, owing to their habit of defæcating in the tea bush areas; whilst coal miners are also especially exposed to infection from soil pollution in the underground galleries. The wearing of footgear of any type protects very remarkably against infection; thus in the United Provinces, Central India, and the Shan States where footgear of a some type or other is almost universally worn, the incidence is extremely low. Domestic animals possibly help to spread hookworm infection by eating faeces, and passing the ova out in their stools; of such carriers pigs are especially important, and also dogs, though cattle and buffaloes also devour human stools and are under suspicion. In the coal mines the one factor which preserves the health of the miners is the presence of cockroaches; these devour the stools deposited in the underground workings and the ova are destroyed by the action of the grinding organs in the proventriculus; it is rather strange thus to encounter the cockroach in its rôle of 'the friend of man.' Dung-beetles on the contrary are a powerful factor in the development of hookworm larvæ,

for they mix the faeces more intimately with the soil and thus help to disseminate the infection.

The character of the soil concerned has important bearings. Clay and black soils are unfavourable towards dissemination of the disease, whilst sandy and porous soils are favourable. Black-cotton soil is especially unfavourable. Salt has a destructive action on hookworm larvæ, and in the Sunderbans stools deposited near the water are reached at high tide and rendered innocuous. The spread of artificial irrigation in India does not appear to be followed by more intensive hookworm infection, a most re-assuring finding, since more than one prophet has foretold that the extension of big irrigation schemes in India would be followed by the spread of hookworm disease. In most parts of India both sexes are about equally affected, but it not infrequently happens that special latrine sites are set aside for females, whereas the males use more open and unreserved ground, and in such places females may suffer more than males.

Age has an important bearing on the epidemiology of the disease. Children commence to become infected soon after they begin to run about, and with increasing age and increasing exposure to infection there is a corresponding increase in the degree of infection with age.

Species.—In Southern India *Necator americanus* is practically the only species present, less than 5 per cent. of the worms examined being *Ancylostoma duodenale*. In Bengal the prevalence of the latter species rises to 20 per cent. In Bihar, according to Korke, *Ancylostoma duodenale* is the more prevalent species. *Ancylostoma braziliense* has not yet been recorded from man in India, but occurs in Burma, Malaya, and the Islands in the Bay of Bengal.

Grades of Infection.—This subject is all-important, and Dr. Chandler divides the degree of infection present into seven grades, as follows:—

- Grade 1; entirely negative.
- Grade 2; less than 100 eggs per gramme.
- Grade 3; 100 to 500 eggs per gramme.
- Grade 4; 500 to 2,000 eggs per gramme.
- Grade 5; 2,000 to 5,000 eggs per gramme.
- Grade 6; 5,000 to 10,000 eggs per gramme.
- Grade 7; over 10,000 eggs per gramme.

Roughly speaking 100 eggs per gramme represent an infestation with about 8 worms, whilst there is some evidence that *Necator americanus* deposits fewer ova than does *Ancylostoma duodenale*. Of course, the vitality and degree of resistance of the patient are important factors in determining whether light infections may give rise to anaemia and other symptoms, and there has been much discussion as to the correlation, if any, between the degree of infection and that of the anaemia present. For all practical purposes, concludes Dr. Chandler, as far as India is concerned, grades 1, 2, and 3 are negligible, even in children. It is only when the egg count rises to a higher figure than 500 per gramme that the infestation causes obvious symptoms. On the other hand group 3, whilst negligible clinically, may be of

importance in spreading the infection. Group 4 individuals are but little indisposed—certainly much less so than the victims of tuberculosis or malarial cachexia; group 5 individuals show mild symptoms, especially loss of energy and vitality, whilst in groups 6 and 7 symptoms are marked or even severe. Dr. Chandler here introduces an 'index of infection' for a community, which is obtained by multiplying the average egg counts (i.e., 1/100th of the eggs per gramme) of the infected individuals by the square of the percentage and getting the square root in order to bring the figures within a reasonable range. This index he proceeds to apply to the different areas of India, and concludes that when it falls below a figure of 200 the infestations are so light as to be negligible. If the index is above 300, then hookworm infection becomes a public health problem of importance for the area concerned.

Provinces.—'The outstanding result of investigations in Southern India, and of our own, in all parts of India' writes Dr. Chandler, 'is the indisputable demonstration of the fact that, in spite of a very high incidence of infections in some parts of the country, hookworm disease is practically non-existent in most places, and limited to a relatively small percentage of the population even in the most severely affected areas. Only in a very few localities in India (some places in Burma, and on some Darjeeling and Dooars tea estates) does the index of infection exceed 400.' These figures may be contrasted with those for the West Indies, where the index approaches 600, and Alabama where it exceeds 500.

In Burma, results are extremely diverse. In the delta region, which is flooded every year, the local inhabitants use primitive latrines, and the infection rate is low. The immigrant Indians however do not; and these infections were the heaviest encountered anywhere in India. The general index for the province is from 108 to 176, and therefore negligible. In the northern tracts and the dry zones there is practically no hookworm disease.

In Assam conditions are not good, and the infection is particularly high on the tea gardens, owing to the universal habit of defæcation among the tea bushes, where conditions are entirely favourable to the larvæ. The general index for the upper Brahmaputra Valley is from 200 to 300, and that for the Surma Valley about 300. The hill tribes appear to be nearly free from the infection, with indices of from 80 to 212. These may be safely ignored.

In Bengal the incidence of infection is high, at a general figure of some 80 per cent., but the degree of infestation low, except in the tea gardens of the Dooars and Darjeeling District. In Eastern Bengal the index is as low as 100, in the Sunderbans it sinks to 50. On the Dooars and Darjeeling tea gardens indices of 400 or more are common, and it is clear that hookworm infection is a very important problem for the tea industry in India. (If such a regulation could be enforced, it would seem that the prohibition of

the practice of defæcation among the tea bushes would almost entirely control the infection.)

In Bihar and Orissa the indices are still lower. In the United Provinces and Central India the index of infection in the eastern and northern parts exceeds 200, but gradually decreases towards the South-West. In the Central Provinces indices are from 100 to 110, or even lower. 'The entire north-western part of India (Punjab, Kashmir, North-West Frontier Province, Sind and Rajputana) is for all practical purposes entirely free from hookworm The entire Deccan is practically free from hookworm, nowhere does the index of infection reach 100.'

In South India Mysore is practically free, but in the Western Ghats and Coorg where there are extensive coffee and other plantations, conditions again approximate to those for the Assam and Bengal tea gardens, and indices range from 200 to 300. 'Madras Presidency has within its limits almost every degree of hookworm infection which can be found in India'; in the Deccan the index is practically nil, in the central part of the Presidency it is about 100, in the South Kanara district it exceeds 200, and in Malabar and Southern Travancore it exceeds 300, particularly on the tea estates.

Conditions in the different provinces are next illustrated in a most informative series of 'bar diagrams,' and Dr. Chandler turns next to the information which the survey has collected with regard to helminthic infections other than by the hookworm.

Ascaris and Trichuris infections.—The main source of these infections is drinking water which has been grossly polluted with human faeces containing the ova. Where rainfall is light, or wells protected by raised curbing, and no floods prevail, infections are negligible. On the other hand, in Bengal, Assam, Orissa and some parts of Madras, infections are heavy. In the flooded part of Eastern Bengal during the monsoon two 'islands' were discovered near Gournadi; in one there were 23 households and a single tank so located that contamination from the defæcation areas was unlikely, and here the *Ascaris* infection rate was only 0.7 per cent.; in the other there were over 100 households and a number of drinking water tanks much exposed to infection, and here 80 per cent. of stools examined showed *Ascaris* infection. At Gosaba in the Sunderbans potable water can only be obtained from one tank which is kept carefully guarded and free from gross pollution; here only one *Ascaris* infection was found in 107 examinations.

Where tanks are not the main source of supply of *Ascaris* infections, the latter always appear to be associated with a heavy rainfall. Running rivers are not responsible for much of the disease, but again the tea gardens throughout India suffer heavily. In the Assam Valley, the Dooars, Darjeeling, Wynaad in S. India, *Ascaris* infections range from 60 to 80 per cent. of persons

examined, and may even surpass the latter figure. At Tukvar an incidence of 85 per cent. is recorded. But there appears to be some factor other than contamination of water supplies at work, for in Lower Burma where latrines are in general use, *Ascaris* infections are very prevalent. Flies and dust do not come much into the picture in such areas, and in Northern India where water supplies are often freely exposed to infection *Ascaris* infections are very uncommon or indices low. It would appear that the blazing sunlight of the dry tropical regions of India is extremely inimical to *Ascaris* ova.

In most areas *Trichuris* infection runs parallel to *Ascaris* infection, and only in a very few places was there marked infection with one worm and not with the other. *Trichostrongylus* infection is prevalent in some parts of India, notably Rajputana and the Punjab, and curiously enough appears to affect Mahomedans as much as Hindus, though the association of Hindus with cattle is closer than that of Mahomedans. *Strongyloides* infection was frequently encountered, in spite of the fact that the conditions under which the stools were examined were adverse to the finding of the larvæ; scattered infections were found in Burma, Bengal, Bihar and Orissa, and the eastern Central Provinces. Flukes are relatively unimportant, except—curiously enough—in the Manipur Valley in Assam, where infection with *Fasciolopsis buski* is of frequent occurrence. The infection is also common in pigs in Assam and Bengal, and these animals undoubtedly serve as reservoirs of the infection for man.

Hymenolepis nana.—A curious fact which the report brings out is that this worm is a comparatively common parasite in many parts of India. In the Punjab a 10 per cent. incidence is recorded, in the Central India Agency 18 per cent., and in the Asansol Mining district 28 per cent. The distribution of *Hymenolepis* and of *Ascaris* infections is almost diametrically opposed to one another, but in a few instances dual infection with both parasites has been recorded. On the other hand the distribution of *Hymenolepis nana* infection in India corresponds extremely closely with that of plague, and this brings the strongest possible evidence forward that the dwarf tapeworm of the rat and that of man are one and the same species. *Ascaris* infections are associated with a water supply freely open to pollution with human faeces, *Hymenolepis nana* infections with an abundance of rats living in close proximity to man. *Hymenolepis diminuta*, which is unquestionably primarily a rodent parasite, was encountered in 23 out of 10,000 examinations.

Tænia infection is practically absent among Hindus, and rare even among Mahomedans. It was found to be common in only two Indian races, among the Bhutiyas and Tibetans in North India, and among the Shans in Burma. Dr. McDonald of the Charteris Hospital, Kalimpong, records 70 cases of *Tænia* infections among 1,400 patients admitted during one year, almost all of

them Bhutiyas and Tibetans. The general infection rate among these castes would appear to be in the neighbourhood of 20 per cent.

Prophylaxis.—The hookworm problem of India is shown in this paper to be of less importance (with the exception of certain districts) than was previously suspected. Nevertheless prophylactic measures are both advisable and necessary. What should these be?

One cannot prevent promiscuous soil pollution in India. It will take decades or centuries of education before so fundamental a change can be evolved in the habits of the people. Yet the village ryot who passes his early morning stool on to the surface of a sunbaked field is doing far less harm than is popularly supposed. The fierce heat of the sun will destroy any dysentery bacilli which it may contain, will shrivel up the cysts of *Entamoeba histolytica*, or the ova of *Necator* and *Ascaris*. It is when he seeks some secluded and shady spot near a drinking water supply, or when rain washes the infective stool into such a water supply that danger ensues.

Are *pucca* latrines the solution of the problem? Dr. Chandler seems to doubt it. The closed-in latrine of Europe is not really suitable for Indian conditions; it tends to become fouled, to become obnoxious, in fact to defeat the very object for which it was erected. One has only to inspect the lavatories in Indian railway carriages to realise how readily such latrines are fouled, and how they repel would-be users. The rural people of India do not like closed-in latrines with sides and roof. 'One can hardly blame an Indian for considering the use of a filthy and smelly latrine far less sanitary and desirable than the use of an apparently clean spot in a secluded place out in the open air.'

The introduction of *primitive* latrines, however, does appear to be practicable. Any arrangement which will keep the feet from coming into contact with the ground before, during, and after the act of defæcation will stamp out hookworm infection, or at least very much reduce its incidence. Such a primitive method is already in general use by the people of eastern and central Bengal where the people habitually stand or sit for defæcation on low horizontal branches or on elevated roots of trees, or on bamboos laid across ditches or pits. 'In our opinion the sanitarian cannot do better as a start than encourage these departures from promiscuous soil pollution in the places where they already exist, and by education and exhortation to endeavour to make their use more universal among the children and men as well as the women, and to extend the custom on the borders of the areas where it already exists.' Standing or squatting on infected ground is the one danger; it should be possible to reform the habits of even the Indian village ryot in this matter. And, as a forcible demonstration of what is to be avoided, Dr. Chandler suggests the actual demonstration to village headmen and schoolmasters of hookworm larvæ, extracted from infected soil before

their eyes, and placed under a low power microscope.

Even if this is not possible, selection and modification of defæcation sites can accomplish something. Areas exposed to direct sunlight should be chosen, and not shaded places, or such as are near a drinking water supply. The spreading of a layer of thatch six inches thick over a defæcation site will prevent access of the larvæ to the feet of people standing on it; and it would not be difficult to build a primitive bamboo platform raised six inches above the ground over a defæcation site. Trench and pit latrines, of however primitive a type, should be encouraged, since hookworm larvæ cannot ascend the vertical wall of a trench. Larvæ developing from a stool deposited into a trench two feet deep only rarely reach the edges of the trench. Further, the wearing of footgear—a most important factor in the campaign against hookworm infection—should be encouraged.

Tea estates present a special difficulty, and here the problem is really serious. The first essential is to prevent defæcation in the area planted with tea. When latrines are erected, special care should be taken to see that they do not become foul or smelly, otherwise money spent on them is largely money wasted.

'If sanitary improvements can be developed to prevent reinfection' writes Dr. Chandler, 'clinical improvement will be rapid even if no treatments are given. We have strong experimental and epidemiological evidence for the belief that hookworms harboured are rapidly reduced in number in the absence of re-infections, and we think that within a year all but the most severe infections would be reduced to a practically harmless level, and that most of the moderate infections would reach this point in six months. We have already shown that an annual dry season extending over four to six months has very much the same effect on the hookworm intensity in a community as has a successful treatment campaign. Nevertheless, mass treatments given during the time that sanitary improvements are being established would unquestionably hasten the beneficial effects, and where practicable they are worthy of consideration.'

On the tea gardens in Sylhet the approximate index of infection is about 300. In this area Dr. Rice carried out mass treatments in two gardens during the hot weather, and Dr. Chandler investigated the results fifteen months later. On Terapassa garden two treatments had been given, one fifteen months previously, the second three months previously; here the index of infection was found to be 59. On Langla garden only one treatment had been given, fifteen months previously; here the index of infection was found to be 98. 'From an examination of these figures' writes Dr. Chandler, 'we are forced to the conclusion that, once having reduced the degree of hookworm infection to a low level by mass treatment, it is not necessary to repeat these each

year, but new arrivals should be treated of course.'

In connection with mass treatment the time of year when these should be given is very important. They should be given in the middle of the dry weather when the heat of the sun will destroy any ova passed. If they are given during the rainy season they may actually make the condition of the soil more infested than ever, and assist re-infections. Unless the results are wanted for scientific publication, it is hardly necessary to examine the stools of all coolies beforehand, and to treat only those who are affected; in all probability about 90 per cent. of the coolies on a tea garden will be infected, and the labour involved in sorting out the non-infected 10 per cent is not worth while; all should be treated. Before the dose is given to each cooly, a cursory rapid examination will serve to sort out those who appear to be in too poor health to be treated. The treatment should be given as far away from pay day as possible, in order to minimise the chances of complications due to alcohol. The best routine treatment, probably, is a combination of 45 minims of carbon tetrachloride with 15 minims of oil of chenopodium, the chenopodium being given in hard gelatine capsules, and the carbon tetrachloride in about half an ounce of saturated solution of magnesium sulphate, diluted with water if desired, both at the same time. This affects *Ascaris* infection also, and although a little more expensive than the treatment with carbon tetrachloride alone, is both more effective and safer than the latter. The treatment should be given about three hours after a meal, which should be as nearly fat-free as possible. Ordinarily, the coolies can return to work on the following day, and not more than half a day's labour need be lost.

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Dr. Chandler's paper marks an important step forward in our knowledge with regard to hookworm infection in India. It corrects our previous conceptions as to the virulence of the infection in this country, and almost brings the hookworm problem within manageable bounds; it points out the important areas, especially the tea and coffee plantations in Assam, Bengal, and South India. Accompanying his paper is an extremely instructive map showing the distribution of hookworm infection with regard to its intensity in India and Burma.

SPECIAL ARTICLE.

MEDICAL RELIEF IN VILLAGES.

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THE question of medical relief in rural areas has always been one of great difficulty in India, where the population is scattered over immense

areas which in many cases are only thinly inhabited. It is, of course, generally admitted that the most satisfactory way of dealing with the problem would be to multiply indefinitely the regular hospitals and dispensaries, and induce fully qualified independent practitioners to settle in large numbers in the country, but under present conditions, financial and other, this does not appear to be practicable. Local Governments are already complaining of the heavy expenditure entailed by the existing medical organisations, and experience has shown that independent practitioners are not likely to be forthcoming for work in the smaller towns and villages. We are therefore, it seems to me, faced with the necessity of finding some other agency if adequate provision is to be made for the smaller communities.

A scheme for utilising primary schoolmasters, with some elementary medical and surgical training, for rural medical relief, has now been in operation in the Bombay Presidency for about three years, and has met with considerable success, and it may be of interest if I place on record here the considerations which led up to this project, together with some details of its working. The present position with regard to our regular medical men is somewhat anomalous. While the proportion of registered practitioners to the population of India is extremely small—it is said to be 1 to 45,000, as contrasted with 1 to 2,000 in England—there is, in the Bombay Presidency at least, an actual surplus in the places where they are willing to settle. Recently in the Surgeon General's office there was a waiting list of 100 graduate and 139 non-graduate medical men for Government appointments, and anyone who will take the trouble to enquire in Bombay, or the district head-quarter towns, or any of the larger centres, will find that there is an almost unanimous opinion that the number of doctors exceeds the demand. The reason for this is two-fold. Men of the class who are now joining the regular medical profession desire social amenities and schooling for their children which are not available in the villages, and they expect larger fees than the majority of the country people are able to pay. It seems clear, then, that even if the regular practitioners were willing to settle in rural areas they are too expensive; and if this is so it is reasonable to argue that some different and less costly agency is desirable.

POSSIBLE ALTERNATIVE SCHEMES.

Many suggestions have been made at various times with a view to remedying this state of things.

(a) At one time the old Subordinate Medical Service met the requirements, to some extent. They were originally trained in the vernacular for only a short period, and belonging, as they did, to a comparatively humble section of society, were content with low salaries and small fees. This non-graduate class has now, however, been improved to such an extent that the best of them are little if at all inferior to the graduates for

practical purposes. Many of them are drawn from the same social strata as the graduates, and demand similar fees, and they are no more willing to settle in villages, except in Government employ, than the graduates. Thus, they do not now meet the case, and to shorten their training would be a very retrograde step. On the contrary, it is hoped shortly to improve it.

(b) Travelling dispensaries have been advocated in some quarters, but so far as my information goes, these are generally recognised to be expensive and inefficient, except under very special conditions.

(c) It has been suggested that a new class of medical man should be instituted with a comparatively short training in English, or in the vernacular, to replace the old subordinate class, but I consider it would not be wise to confer a regular certificate to practise medicine and surgery on a half trained man of this description.

(d) The employment of compounders, trained in English as they are, has been suggested, but that again is open to objection. The prescribing compounder has always been regarded with aversion by regular practitioners, and I think with reason. He is likely to pose as a doctor, and attempt medical procedures beyond his capacity, and may thus be a danger to the public. Compounders also at the present time demand a comparatively high salary, and if they are properly trained deserve it.

(e) It has also been proposed to recognise the *vaidyas* and other indigenous practitioners. This is a controversial subject which I do not propose to enter on fully at the moment, but much as I admire the work of the old Indian pioneers, such as Charaka and Susruta, I think that we would do well to pause before we perpetuate theories and practice which will not stand criticism in the light of modern science. It is worth while, perhaps, to quote the experience of the Japanese in this connection. At the beginning of their present period of development on modern scientific lines they were faced with much the same problem in relation to their ancient medical system, which was derived from China, and no doubt embodies much matter of interest from the old Chinese writings; but I am informed on good authority that the vast majority of the people have now adopted modern medicine, and that the older system has practically ceased to exist.

The difficulty is to find a method which would not involve the creation of large numbers of medical men of an inferior order. We have the public, as well as our existing practitioners, to safeguard. The present training of our medical students is admittedly none too thorough, and it would be a disaster if any easy back-door to medicine were thrown open.

This objection, however, would perhaps not apply to a distinct class of "village aid" men, trained to render elementary relief in places where no medical men are ordinarily available. My original idea was to take a selected Civil Hospital in each of the 4 chief language areas of the Presidency,

and train 4 or 5 of these men in each, as a beginning. They were to be selected from the villages chosen, as far as possible, and taught, in the vernacular, elementary anatomy and physiology such as is now taken up in many schools, elementary compounding with regard to perhaps a dozen drugs, rough ideas of hygiene (ventilation, clean water, prevention of malaria, etc.), recognition of and simple remedies for the most important diseases, and first-aid work, including the dressing of wounds and ulcers, and what is practicable with regard to eye diseases. Special attention was to be devoted to teaching them to recognise diseases, such as cataract, which, while not suitable for treatment by them, would stand to benefit by a visit to the nearest hospital, and in this way village aid posts should serve as feeders for existing institutions. The men were to work in the wards and out-patient department, the course being made as practical as possible. When trained, they were to go to their villages, and it was proposed to offer a free house and a small retaining fee as an inducement to them to reside there permanently, and to look after the poor gratuitously. As regards persons who could afford to pay, it was intended that the "Upacharak" (i.e., aid man), should be allowed to charge small fees, in order to supplement his allowance.

Practitioners without regular medical qualifications have always been regarded with suspicion, and it is necessary to move with caution in proposing a measure of this kind. In the first place it was desirable to know what view the regular medical profession would be inclined to take with regard to it. I spoke to many representative doctors and was glad to find that the great majority endorsed the proposal, and saw no harm in it from the professional standpoint. This came as no surprise, for the profession has always been broad-minded on large issues, where it considers the good of the public to be concerned. Apart from this, however there were certain instances which could be quoted as forming in some measure a precedent for these proposals. The nurses of the Infant Welfare Centres in Bombay and elsewhere are doing work almost identical with that sketched above, lay missionaries are trained for a few months at some of the English hospitals, with similar ends in view, and as regards eye diseases, the Inspectors of Mr. Henderson's Blind Relief Association (a private association started by Mr. C. G. Henderson, i.c.s.), are covering the ophthalmic part of the programme in Bijapur and Gujarat. Finally, I am informed by a veterinary officer of great experience that it is proposed in one province to revive the old *salutari* class, for village veterinary work, and that he personally is in favour of a quite short vernacular training, for two reasons. In the first place, for economy, and in the second to emphasise the distinction between the *salutari* and the practitioner with a complete training and regular qualification. The Veterinary Department appears to be faced with very much the same

problem as ours, and there is much evidence to show that the humble partly trained man known from long ago as a *salutari* is a very useful individual.

THE VILLAGE AID SCHEME.

For these reasons I am still of opinion that my original proposal was quite sound and practicable, but it met with opposition in various quarters, and we eventually decided to utilise primary schoolmasters, instead of creating a new class of whole-time men.

The adoption of this modification has solved several difficulties. It is even more economical than the original scheme, provides an educated personnel, does away with the contention, which has been frequently brought forward, that a special class of men would not have enough to do, or be able to make an adequate living, and also meets the objection, which was raised by a certain number of medical men, to the creation of a new category of half trained people who might pose as doctors.

The project having passed the Legislative Council, arrangements were made to train five schoolmasters at the Poona, and five at the Bijapur Civil Hospital, as a commencement. A Sub-Assistant Surgeon on the staff of each hospital was given a special allowance of Rs. 25 a month, and Red Cross diagrams and models were provided, together with the St. John's Ambulance and other literature, the special cupboard and equipment which each "Upacharak" is furnished with splints, dressings and a skeleton for demonstration purposes. A simple vernacular manual, covering most of the ground, has also been compiled. The Collectors of Poona and Bijapur, both of whom were favourable to the scheme, were each asked to select, in consultation with their District Local Boards and the educational authorities, five villages of about 1,000 to 1,500 inhabitants, within easy reach of head-quarters (for convenience of inspection), the headmasters of the primary schools in which were willing and considered suitable to undergo training for 2½ months at the respective civil hospitals, on the terms offered. Schools were chosen in which there were two or more masters. During training each master drew a proportion of his salary in addition to the training allowance of Rs. 15 a month, and it was found that an allowance of Rs. 10 a month to the trained man for village work was sufficiently attractive to bring forward volunteers. During training free quarters were provided as near the hospital as possible. The Director of Public Instruction emphasised the desirability of taking headmasters, and not their juniors, and thought, as regards the work in the villages, that arrangements should be made to hold school at mid-day, when this was not already the practice, so that the medical work could be done in the morning. Thus, school might be from 11 a.m. to 5 p.m. (with any necessary break) and medical work from 7 to 8 a.m., subject to modifications corresponding to local conditions and the different seasons.

A large medicine cupboard and dressing table, with simple dressings, and a receptacle for water and waste bucket are provided. The drugs are of course of the most elementary description and few in number, only about 16 preparations being supplied for both internal and external use. Similarly, the appliances consist only of a spring forceps and scissors, with bowls, dressing trays, measure glasses, and a spatula. For internal use the preparations are restricted as far as possible to tablets and pills, so that hardly anything of the nature of dispensing is required. The work is carried on in the school-room, before or after school hours, thus avoiding the necessity of providing a special building. The object aimed at is to enable the masters to do the kind of work that is being done, apart from duties more strictly pertaining to a nurse, by nurses at the Infant Welfare Centres in Bombay, viz., to recognise some of the more important diseases and administer simple remedies, to dress wounds and ulcers and to treat conjunctivitis. They are also given some idea of what is generally known as first aid work, and taught the main principles of hygiene. They are instructed to send cases which they are not capable of dealing with themselves to the nearest hospital or dispensary. Incidentally, of course, they form a very useful agency for the distribution of quinine.

The estimated total cost of training one master (assuming all the candidates pass the practical examination which is held at the end of the course) is Rs. 72, and the maintenance of a trained master in the village, inclusive of a moderate supply of drugs and his allowance of Rs. 10 and dressings comes to Rs. 300 a year. The period of 2½ months has been fixed so that four batches can be trained in a year. Thirty masters have been trained as an experimental measure, and all have now been at work for a considerable period.

The ultimate question of financing this movement, if it reaches any considerable dimensions, has yet to be settled, but it is hoped to interest local bodies, and in particular the District Local Boards and village authorities, so that they may contribute. The control would also, presumably, be eventually in the hands of local bodies, which would no doubt welcome the co-operation and advice of the various district authorities, more especially those of the revenue, educational and medical departments. We have fortunately had the most cordial support and co-operation of the Educational Department throughout, and the movement owes a great deal to the advice and assistance of Mr. Pendarves Lory, Director of Public Instruction in the Bombay Presidency. The only serious departmental difficulty which has arisen is the question of transfer of trained masters, which sometimes becomes necessary in their own interests, or for service reasons, but that is capable of being overcome by having a few trained men in reserve, and putting up for the course only those who are of such seniority as to be likely to remain for some time in places where village aid posts have been established.

In conclusion, to give an idea of the progress of the scheme, the following article, which appeared in the *Indian Daily Mail* of the 8th June, 1927, may be quoted.

"VILLAGE AID SCHEME."

The system of "Upacharaks" Helping Country-Folk Found Successful.

"About three years ago the Government of Bombay introduced a scheme for the medical relief of the rural areas, which is now known as the 'Village Aid Scheme.' Arrangements were made in the Civil Hospitals at Poona and Bijapur for the training of primary schoolmasters in elementary medicine and surgery on 'First Aid' lines and as a result thirty of them were established in villages of about 1,000 to 1,500 inhabitants in the Districts of Poona, Bijapur, Sholapur and Dharwar, where, in addition to school duties, under the designation of 'Upacharaks' they have been giving help to villagers in minor ailments, sending on cases which they are unable to deal with to the nearest regular dispensary or hospital.

The Surgeon-General has now reported on the scheme and states that on the testimony of both officials and non-officials its working has been successful. The 'Upacharaks' have during a period of 16 months dealt with 22,992 cases in Poona, 54,799 in Bijapur, 19,573 in Sholapur and 23,897 in Dharwar Districts. Commenting on their work the Civil Surgeon, Bijapur, observes:—'I have carefully inspected their work from time to time and I feel thoroughly convinced of the utility of these small aid posts in rendering help to our poor ryots, who now willingly seek medical aid from them. It is now a common sight to see clean dressings applied to the wounds of these villagers in place of the usual dirty rags, leaves, feathers, etc.' The opinions of other officers including Collectors and Civil Surgeons and non-officials like Presidents of Local Boards and Municipalities are in the same strain. The scheme has doubtless some obvious limitations and, as the Surgeon-General says:—'It is only suitable for villages of moderate size and the men can only deal with work of an elementary nature, but nine-tenths of the work of a regular dispensary is also of an elementary character. They can dress wounds and ulcers, use simple lotions for conjunctivitis and ear discharges, treat skin diseases, do what is ordinarily known as first-aid work, and administer simple remedies such as quinine, astringents and purgatives. In addition, they may be useful in village sanitation. They may disinfect wells, and, as will be seen from one of the reports, induce the villagers to adopt simple measures of cleanliness. In many ways they will be very useful men in places where there is no regular medical practitioner available, and the cases they cannot treat themselves can be advised to go to hospital. In this way village posts serve as feeders to the civil hospitals.'

The scheme was initiated as an experiment with a view to see whether, if such facilities for medical treatment were made available for them, the villagers would take advantage of them. The results so far reported by the District Officers and others who have had opportunities of watching the work of these 'Upacharaks' have proved that the villagers readily take advantage of the facilities offered to them by this scheme. It is hoped that if the scheme can be further developed as funds become available, it may help to solve the most difficult problem with which the Medical Department has always been faced, viz., the problem of establishing a system of medical relief in the villages at a reasonable cost. Hitherto the difficulty of inducing qualified doctors to practise in the villages owing to the unremunerative nature of such practice, and the heavy cost of opening and maintaining a large number of dispensaries, seemed to make this problem insuperable. The results so far achieved by this village aid scheme afford ground for hope that by the treatment of the simpler ailments, affording first aid in case of accidents and inculcating the elements of sanitation in the minds of the villagers, the 'Upacharaks' may do a great deal towards solving it."

A Mirror of Hospital Practice.

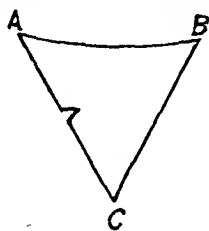
AN UNUSUAL CASE.

By J. L. LUNHAM,

LIEUT.-COL., I.M.S.,

Civil Surgeon, Dharwar.

C. F., aged six, female, English, was admitted on 7th December, 1927, with a history of having swallowed and passed a large piece of glass the previous day. The description of the piece of glass was such that it is almost incredible that so large a piece could, in the first place, have been swallowed, and, if swallowed, that it could have been passed. A sketch of the piece of glass, made by the nurse in charge of the child, is shown and had sharp edges, A—C and B—C. After swallowing this porridge had been given followed by castor oil. A few hours later the piece of glass was passed. Profuse hæmorrhage set in and the child was put in a motor taxi and brought 110 miles by night, arriving at my bungalow at 5 a.m. on 7th December, 1927. During the journey there



had been four attacks of hæmorrhage. The nurse stated that in all about three pints of blood had been passed. This must have been an exaggeration.

On examination, the child was somewhat collapsed. The abdomen was soft. Slight tenderness was complained of to the left of and below the umbilicus; $\frac{1}{4}$ gr. of morphia was injected, and the patient taken to the Civil Hospital. Before arrival there were four more hæmorrhages, each about a teaspoonful of bright blood.

Rectal examination showed no sign of a cut. Intravenous glucose and saline was given. A slight hæmorrhage took place and after this all bleeding ceased. About mid day collapse set in. It was thought at one time that the child was dead, but artificial respiration brought her round. She remained conscious but in a very weak state for the rest of the day. Early next morning she developed a typical tetanic spasm. Opisthotonus and lockjaw were well marked. A small septic sore was found on the right foot. The temperature rose to 106°F . The child was packed in ice, 1,500 units anti-tetanic serum injected, and chloral given per rectum. The following morning lumbar puncture was done. The fluid was under very high pressure and about 25 c.cms. were allowed to escape. 1,500 units serum were injected into the spinal canal. Lumbar puncture and injection of serum was performed in all four times and each time the fluid was under high pressure. It remained clear throughout. The blood was examined on three successive days for malaria with negative result. On the fourth occasion a slide examined in the Civil Hospital was negative, but another slide, sent for examination elsewhere, was reported to contain malignant malaria parasites. Acting on this quinine, intravenous and intramuscular, was given in large doses. Quinine had previously been given per rectum. Another doctor, one of large experience, who also examined this slide, failed to find any parasites so the question of malaria is a doubtful one.

The spasms persisted throughout the whole course of the disease. They were difficult to control and were more marked when the temperature began to rise. Morphia seemed to be the only drug to have any effect. Opisthotonus was always well marked. Sometimes there was tremor of the arms and legs. The leg on which the septic sore was situated was always more rigid than the other. The lockjaw passed away almost entirely on the third day. The abdomen remained soft, luckily, as otherwise laparotomy might have been done, as was indeed advised.

Packing in ice, sponging and iced enemata were employed to control the temperature. What it might have risen to without these, is difficult to say.

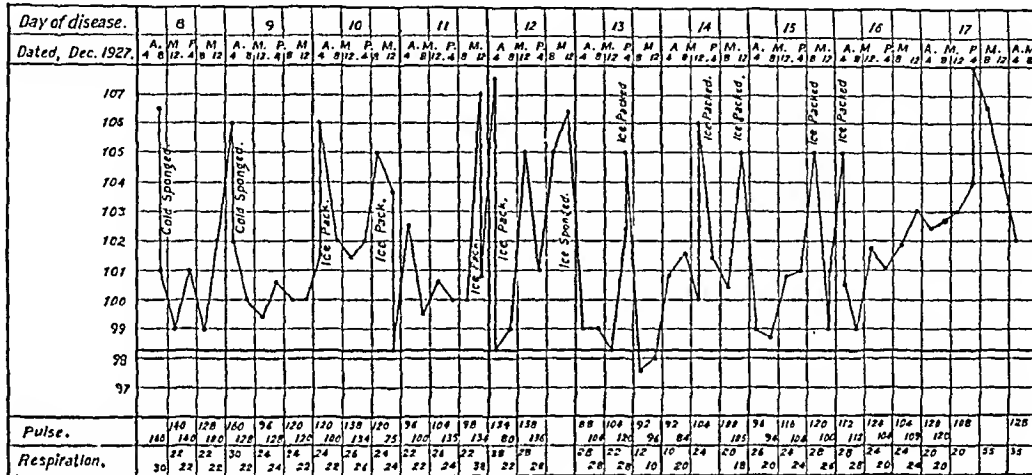
The urine was normal; Kernig's sign was absent; the head was not retracted except during the spasms.

On the fifth day the child passed per rectum a quantity of sloughs, evidently from the cuts along the intestine. She remained more or less unconscious the whole time, but could be fed to a certain extent through the mouth. The fatal termination was ushered in by a temperature of

108°F. and hypostatic congestion of the lungs. Previously on three occasions it was thought that the child had only a few hours to live. On one occasion the respirations fell to six per minute and the pulse, when it could be felt, was very intermittent. An extraordinary feature of the case was to see the child, apparently on the point

in the Hostel of the Government M. V. School, Dakuakhana, under similar conditions, and a daughter of a forester, who was also living very close to my dispensary. It is not very easy to get patients to take injections in a rural area like this, but, being the Medical Officer of the Hostel and having help from the Hostel Superin-

Name ... Clare Fulton. Age ... 6 years.



of death, revive again to such an extent as to give hopes of recovery. During one period of 24 hours seventeen hypodermic injections of stimulants were given as well as saline glucose, both intravenously and per rectum.

As regards diagnosis, was this a case of (a) tetanus, (b) malignant malaria, or (c) tetanus *pari-passu* with malignant malaria?

The condition must have been considerably aggravated by septic absorption from the cuts along the intestinal tract.

THE TREATMENT OF SIMPLE GOITRE WITH SODIUM IODIDE INTRAVENOUSLY.

By SARAT CHANDRA BAROOAH, L.M.P.,
Sub-Assistant Surgeon, Dakuakhana, Assam.

I WAS much interested on going through the articles published in the *Indian Medical Gazette*, April, 1925, by Lieut. E. A. Davies, I.M.D. and Dr. P. Bell, I.M.D. and in March, 1927, by Dr. A. V. J. Reddi, regarding the treatment of goitre with sodium iodide, and was very anxious to make a trial of this treatment, as in most of the outlying dispensaries in Upper Assam a large number of goitre cases are met with and the medical officers have to satisfy the patients with a little red ointment (Ung. hydrarg iodi rubra) which has very little effect in curing the disease. The red ointment reduces the size of the goitre in certain recent cases only.

While I was in charge of Dakuakhana Dispensary in the Lakhimpur District, a locality where the disease is endemic, I had the opportunity of carrying out this simple treatment successfully. In April, 1927, I selected six students who live

tendent, I was able to secure permission for these boys to undergo a regular course of the treatment. The following are details of the cases:—

The technique of treatment was as follows:—

Six grains of pure sodium iodide was dissolved in 5 c.c. of sterile water and injected intravenously every alternate day, and tincture of iodine m. iv. in half an ounce of water was given orally t.d.s. (except on the injection days) for one month from the date of commencement of treatment. Six to eight injections are sufficient to effect a cure in recent cases.

I observed no unfavourable symptoms in carrying out this experiment, but I am not sure how long the good effects will last, as the goitre may recur owing to the fact that these patients have to remain in the same surroundings. To prevent recurrence, they were instructed to adopt the following measure (a) to take tincture of iodine m. v. daily in a lump of sugar or in milk, preferably the latter, as it forms a true colloidal solution (iodo-casein), for 6 months more; after which (b) 2 grs. of sodium iodide for 2 weeks every 6 months were to be taken orally.

Iodised sweets have no doubt a beneficial effect in curing the disease but take a long time. No appreciable result can be noticed within one year. I have experience of one case only—to whom iodised chocolates were given for more than a year and a good result was seen after 14 months of its use.

It is certain that goitre can be cured in many cases if iodine is given in any form to the system. The intravenous route is short and non-tedious.

My object in publishing these notes is that there are many physicians in outlying dispensaries who have been very disappointed with the treatment of goitre cases; they may try this

S. No.	Out-door Rgr. No.	Name of patient.	Age.	Sex.	Size of goitre.	No. of injections given.	Total quantity of sodium iodide given.	Result of observation after 1st month.	Result of observation after 2½ months.	Result of observation after 6 months.	REMARKS.
1	2146	Iliak Chandra.	14	M.	Mango size	4	24 grs.	No reduction noticed.	Still no reduction.	No information.*	Irregular treatment.*
2	2148	Harendra-nath Datta.	13	M.	A big marble size.	7	42 grs.	Much reduced.	Nearly disappeared.	Goitre disappeared.	
3	2149	Mitharam ..	13	M.	Golf ball size.	8	48 grs.	Ditto ..	Still a little to reduce. Now less than the size of a marble.	Goitre disappeared.	
4	2150	Thaneswar Sarma.	14	M.	Ditto ..	6	36 grs.	Very little reduction could be seen.	Still much to reduce.	No information.*	Irregular treatment.*
5	2151	Muluk Ch. Gogoi.	12	M.	Big marble size, both sides of the neck.	8	48 grs.	Nearly reduced.	Completely disappeared.	Goitre disappeared.	
6	2673	Durga ..	12	M.	Golf ball size.	6	36 grs.	Reduction noticed.	Still a little to reduce.	Ditto ..	
7	2373	Chani ..	9	F.	Big marble size.	7	42 grs.	Ditto ..	Only a trace to be reduced.	Ditto ..	Very regular treatment.

* These two boys were absent from the Hostel for a certain period at the time the Hostel Superintendent was submitting the report.
Reported by the Superintendent of Hostel on 6th September, 1927.

simple and cheap treatment, and may publish their results.

In conclusion, I am much indebted to my medical officer, Lt.-Col. D. L. Graham, O.B.E., I.M.S., Civil Surgeon, Lakhimpur, for the kind permission he has given me to publish these notes, and also to the Hostel Superintendent, Government M. V. School, Dakuakhana, for taking special care in sending the students to undergo the treatment regularly.

REFERENCES.

- (1) Davies, E. A. and Bell, P. Intravenous Injections of Sodium Iodide in the Treatment of Goitre. *Indian Medical Gazette*, April, 1925, p. 163.
- (2) Reddi, A. V. J. Intravenous Sodium Iodide in Goitre. *Indian Medical Gazette*, March, 1927, p. 147.

A CASE OF IDENTICAL DELIRIUM IN REPEATED ATTACKS OF BLACK-WATER FEVER AT LONG INTERVALS.

By RONALD SENIOR-WHITE,
Malariaologist, Bengal Nagpur Railway.

C. F. H., Civil Engineer, first came to the tropics in 1901. For the first two years of his residence in Africa he had no malaria, but in 1903, after a visit to Portuguese East Africa, he developed blackwater fever on his return to Johannesburg. At that time his work on the

Rand Mines consisted in the erection of barracks for Chinese labour, and about two months before his attack, and before his visit to Portuguese East Africa, he had had some professional trouble in connection with the erection of these barracks, inasmuch as the gusset plates—small pieces of angle iron—which were all supposed to be interchangeable, proved not to be so, and the work was therefore troublesome beyond necessity. He states that the trouble over these plates neither imperilled his post nor did the worry rob him of sleep, but during the delirium he was occupied mentally in counting these plates into a heap, moving them from left to right; having made the stack, he then got the idea that all this was all wrong, and re-stacked them from right to left.

After the blackwater attack he was invalided home. Subsequently he came to India, and had malaria badly between 1907 and 1915 becoming a chronic relapser, but thereafter this condition improved, and he describes himself as having become 'acclimatized.'

In September 1926, he was on survey in Mayurbhanj State, in Orissa, and for at least twelve months previously had had nothing to do with gusset plates or construction work at all, though he states that after the first attack the work he had been engaged on had constantly involved the use of such. A week after his return

to Calcutta he again developed blackwater fever, and he states that during this attack he experienced delirium absolutely identical with that of his primary attack twenty-three years previously with the same delusion of counting gusset plates.

The recurrence of the delusion after such a long interval, and especially after twelve months' employment on totally different duties is interesting.

TWO CASES OF RENAL TUMOUR IN YOUNG CHILDREN.

By MRS. SATYAPRIYA MOZUMDAR, M.B. (Cal.),
L.R.C.P., M.R.C.S., F.R.C.S. (Eng.), L.M. (Dub.),
Hon. Surgeon, Barh Hospital, Dist. Patna.

Case No. 1.—A little girl, about 6 years old, was brought into the hospital complaining only of a large growth in the abdomen. Subjective symptoms were none, except those due to the size of the growth; there was no hæmaturia or pain. The duration given was two years. On examination the growth was found to be occupying more than half of the abdomen on the left side and protruding about 2 inches in front. The mass was irregular in outline and semi-solid in consistency. Considering the age and sex of the child, along with the physical signs, it was thought to be a case of congenital polycystic kidney.

An operation of nephrectomy was decided upon as the tumour was hampering intestinal and respiratory movements; presumably the other kidney was working as the child was otherwise healthy.

On operation, by a prolonged transverse incision, it was found to be a hypernephroma, the typical, yellowish-red soft growth being situated on top of a quite healthy-looking but a slightly enlarged kidney. The tumour was encapsulated almost entirely except at its inner margin, where it invaded the region of the aorta and lumbar glands. Probably the growth was completely encapsulated and innocent at first, when it was slow-growing, but recently, according to the history, it had suddenly increased in size, and had apparently become malignant. It went beyond the middle line and partially surrounded the aorta and the large veins there.

The kidney itself, though healthy to look at, had to be sacrificed along with the tumour for fear of recurrence, but unfortunately it was found towards the end that some parts of the growth had to be left behind where it had encroached on the aorta and big veins. The child stood the shock of the operation well and made a good recovery except for a stitch sinus which healed quickly on removal of the stitch. But during convalescence, a peculiar symptom appeared. Large patches of alopecia areata appeared on the head, suggesting some disturbance of internal secretion. She was put on thyroid extract and calcium lactate, and at the end of three months, when I saw her again, the hair had

started growing. The pathologist's report confirmed the diagnosis of hypernephroma. Although 3 months after the operation, the child had put on fat and was quite healthy to all appearance, I am not at all satisfied that recurrence will not take place. Unfortunately, though asked to report at the hospital once every month, she has not turned up yet. I am trying to make enquiries about her condition through the local thana.

Case No. 2.—A boy about 10 years was brought in with a large cystic growth in the abdomen, with the history that he fell from a tree about a fortnight before and had developed this swelling since. The size and tenseness of the abdomen was such that it was impossible to believe that statement. It was the size of a large ovarian cyst, and, if the patient had not been a boy, one would certainly have thought of an ovarian in this case.

On examination a uniform tense swelling was found filling the entire abdomen, with a distinct thrill. But beyond the fact that it appeared to be a unilocular cyst one could not venture on any diagnosis, in the absence of any symptom whatever, except the mechanical discomfort from it. The apex of the swelling was in the middle line about the umbilicus so that there was nothing to indicate that it was not an intraperitoneal growth.

But to my surprise, on opening the abdomen in the middle line, it was found to be a retro-peritoneal growth coming from the right kidney region. So an incision was made through the posterior peritoneum, and the cyst being so enormous that it could not be brought out of the wound it was tapped. As expected, it was an unilocular cyst with a thin fluid which had a very large admixture of blood. Unfortunately, a specimen of the fluid was not kept for examination but it was not mucoid, nor had it any urinary odour.

What puzzled me was, what was this cyst? The wall of the cyst was very thick and smooth, there was no trace of any kidney substance. It was smooth inside and out. That it could not have been of a fortnight's duration only, was perfectly clear. But there was the definite history of a fall from a tree and noticing of the swelling since then.

I fancy that the cyst must have been there at least a year before, but it did not produce any symptoms to have attracted the attention of the patient. It is probable that the fall from the tree led to sudden hæmorrhage and consequent enlargement of the swelling, and that this was enough to draw attention to it.

The diagnosis lay between a hydronephrosis (congenital or acquired) and one of that rare condition, solitary cyst of the kidney. From the naked eye appearance, it could easily have been either; and as the ureter could not be reached during operation, nor could it be examined after death, as a post-mortem was

not allowed, the actual diagnosis of it must remain uncertain. The enormous size of the cyst point more to a hydronephrosis than a cyst; but beyond this any speculation is futile.

The sac was excised, except a small portion which had gone beyond the middle line and too far below to be approached. The peritoneal wound was stitched with a drain left through the loin. This drain probably closed too early or was insufficient, for the patient did quite well for 5 to 6 days, after which he developed signs of peritonitis and died on the 12th day. If another drain had been left in the peritoneal cavity, probably peritonitis could have been avoided. But the child had a very poor physique to begin with, and then this large amount of hæmorrhage inside the cyst must have enfeebled him further, so that he could not cope with the strain.

A CASE OF SPONTANEOUS RUPTURE OF ENLARGED SPLEEN.

By G. RAGHUNATHA RAO,

Medical Officer, Leper Asylum, Cuttack.

SPONTANEOUS rupture of enlarged spleen is rather rare. Waddell, in *Lyon's Medical Jurisprudence for India* (6th Edition, 1918) has given a description of three illustrative cases and also mentions that two more cases were published in the *Indian Medical Gazette* of 1904. Therefore, a brief description of the following case which recently occurred in this asylum may be of interest.

B. M., Hindu, male, age 45, a "B3" case of leprosy and an inmate of this asylum had an enlarged spleen which extended down to the left iliac fossa and to the right about 1 inch beyond the umbilicus. The duration of the enlargement was $1\frac{1}{2}$ years. He used to get occasional attacks of fever. His blood was examined on one occasion, and numerous benign tertian gametocytes were found, and also a few trophozoites. He refused to undergo a complete course of treatment with cinchona febrifuge. A quack doctor whom he secretly consulted branded him over the skin of the abdomen in the region of the spleen. For 2 months after branding he was all right.

On 6th December, 1927, at about 6 a.m. he was suddenly seized with a violent pain in the region of the spleen. He had not sustained even the slightest injury, not even straining at stool. He became restless and when I examined him at 7-30 a.m., he had a hæmorrhagic pulse. On inclining to the right side the right flank showed a distinct bulging and a dull note was elicited on percussion. The bulging was found to be due to fluid and not to flatus or fat. He felt great discomfort as the abdomen was gradually distending. At about 11 a.m., he expired. Shortly before death, his abdomen was fully distended and the enlarged spleen, though not fully palpable, could be distinctly felt as if it were floating.

An autopsy in this case would have been valuable, but it could not be done as this asylum is a private institution and there are no facilities for conducting autopsies.

ATROPINE SULPHATE IN A CASE OF STRANGULATED HERNIA.

By P. M. ABRAHAM, L.M.P.,

Forest Tramway Dispensary, Kuriarkutti, Chalakkudi.

I WAS in camp at Chalakkudi on the 10th January, 1928. That evening at about 9-30 p.m. I was called in to attend on a case of strangulated hernia.

History.—Jabar Sahib, a watchman attached to the tramway workshop, aged about 40, used to get intestinal colic now and then due to constipation of a chronic nature; on these occasions he used to get himself cured for the time being.

On the 8th January he got a similar attack and as usual he took an ounce of castor oil with some warm coffee early in the morning next day (9th January). He got only three motions, but not one of them was quite satisfactory, and he began to feel some sort of uneasiness in the right inguinal region where he noticed a slight swelling in addition. By next morning the condition grew worse, the pain in the inguinal region was increasing and the swelling that he noticed on the previous day also increased in size. So he sent word through one of his relations to one of the local doctors who apparently sent a few ounces of mistura alba. The patient took a few doses of the mixture; every time he took the mixture he vomited and the swelling noticed began to increase in size, and so at about 6 p.m. he was taken to the same doctor who tried to reduce the swelling without success, and as a result of that he advised the patient's relations to take him to Trichur. Since there was no convenient train, it being late in the evening and since he was not able to hire a motor vehicle, they were not able to take him then and there. Consequently they had to wait till the next morning (the 11th). In the meantime one of the patient's relations came to me and requested me to have a look at the patient. When I saw the patient, he was rather restless, the abdomen distended, pulse weak and rapid, vomiting present, face pale, tongue furred and eyes a bit sunken. The swelling in the inguinal region and scrotum was about three times the size of a tennis ball. On account of the pain he would not allow me to manipulate the swelling freely. Of course the swelling was of an elongated shape. After examination I told them that in case there was no improvement by next morning he should be taken either to the General Hospital, Ernakulam, or the Civil Hospital, Trichur, the two well-equipped institutions of this State.

After this I gave him an injection of atropine sulphate 1/100 grain hypodermically and advised him to have mild and gentle turpentine fomentations; in addition I got the scrotum raised a bit by a small cushion made for the purpose. I returned from there asking the relatives to let me know the condition by five o'clock in the morning. By morning to everybody's surprise the swelling disappeared; the patient had three good loose motions and he was feeling hungry. During the early morning I went there and put a pressure bandage in the inguinal region and asked him to take complete rest for a week and liquid diet. After this period he began to have his daily routine of work and diet. When I was leaving the station for my headquarters which is some 41 miles away from there I found him quite healthy.

It seems to be well worth while to give a trial to atropine sulphate whenever possible in such cases, as suggested by Captain N. N. Ghosh (vide *Indian Medical Gazette*, December, 1927).

Current Topics.

London School of Hygiene and Tropical Medicine.

(Division of Tropical Medicine and Hygiene.)

EXAMINATION RESULT. 83RD SESSION.
OCTOBER, 1927—FEBRUARY, 1928.

Passed with Distinction:—

H. M. Smith—Winner of "Duncan" Medal.
R. Pierre.
V. E. Whitman.
M. M. McDowall.
D. R. Jandial.
H. A. Fawcett.
M. N. Andrews.
G. M. L. Summerhayes.
A. M. Soliman.
J. H. Dobbin.
S. Bergsma.
A. B. Hardy.
P. G. Currid.
C. H. Williams.
A. Bearblock.
B. M. Johns.
T. P. Keating.
W. E. Davis.
M. M. Fikri.

Passed:—

E. S. Lawrie.
G. A. Ryrie.
G. I. Shaw.
H. G. FitzMaurice.
A. Magraby.
E. A. Robertson.
H. Fairbairn.
W. E. Giblin.
H. H. Gilbert.
G. A. Sloan.
T. P. Ammal.
R. E. Barrett.
S. Forrest.
H. K. Giffen.
J. C. P. Grey.
C. R. Amies.
M. Merchant.
O. M. Francis.
E. B. Jones.
N. C. Macleod.
J. D. Reynolds.
P. E. Dinkins.
E. Farra.
W. M. Jack.
J. C. Milne.
M. E. Lovett.
G. Singh.
E. P. G. Ritchie.
H. M. Willoughby.
E. W. Reece.

T. A. Sherwin.
N. J. Willans.
A. Dunlop.
P. T. J. Doss.
R. S. Johnston.
H. J. Lawson.

W. Magowan.
E. I. Conner.
G. G. Udeshi.
R. M. Forsayeth.

14th February, 1928.

"Poona-itis."

For many years Poona has been notorious for the great prevalence of intestinal disorders in that station during the monsoon, a condition which is generally referred to as "Poona-itis." This matter was the subject of an enquiry by Lieut.-Col. J. Morison in 1913-14, who came to the conclusion that it was impossible to separate out the various intestinal disorders prevalent, either clinically or bacteriologically; all were included under the general term "Poona diarrhoea." It was noted that the prevalence of flies in the station bore a close relationship to the intestinal disorders during the early part of the monsoon, but in August the number of flies dropped rapidly, but not the incidence of intestinal disorders. The diarrhoea was apparently closely related to the rainfall, and was suspected to be due to the contamination of Lake Fife from which the Poona water supply comes.

In 1925 conditions among the troops in Poona were just as bad as ever, and a renewed study of the subject was taken up by Major J. A. Manifold, D.S.O., R.A.M.C. and Military Assistant Surgeon A. J. de Monte, I.M.D. Their report appears in the *Indian Journal of Medical Research* for January, 1928 (Vol. XV, No. 3, p. 601), and is a document of paramount importance to all laboratory workers in this country.

They found on commencing their work that conditions in Poona in 1925 were similar to those in 1913, with the important exception of the water supply. This was unimpeachable; the catchment area around Lake Fife had been well protected, the water was also chlorinated, and on daily bacteriological examination never yielded lactose-fermentors in 100 c.c. Thus, whatever Poona diarrhoea was due to, the water supply could be at once ruled out. The enquiry was unfortunately suddenly interrupted in October, 1926, when Major Manifold was transferred elsewhere, but even the incomplete report, which is given in sections, is of great interest.

The first essential was to secure the co-operation of the officers in charge of the various military hospitals, and this was readily forthcoming; indeed the authors point out the importance of such collaboration; without it the laboratory worker is working in the dark. Every soldier suffering from diarrhoea, of however mild a character, was ordered to report sick; printed instructions were circulated to all medical officers and assistants, also printed case sheets, particulars on which had to be filled in in detail. Sera were collected, fly traps issued, and weekly fly records instituted.

The first and most important finding is that almost all these cases of Poona diarrhoea are due to mild infections with the dysentery bacillus of Flexner. Indeed, it would appear that that bacillus is far more often the cause of diarrhoea than of dysentery. It was also responsible, however, for the greater majority of cases of dysentery in the station. Infections due to the bacillus of Shiga were far less prevalent, but if such patients reported at once, and were immediately put under treatment, the disease might run just as mild a course as in the case of Flexner bacillus infections. With proper co-operation between hospital authorities and the laboratory it was nearly always possible by the microscopic examination of the stools to separate mild bacillary dysentery, with its characteristic cellular exudate, from diarrhoea. Both conditions are present in Poona during all months of the year, but increase markedly during the monsoon period. Amoebic dysentery is a comparatively rare disease among the troops, as contrasted with the great prevalence of bacillary dysentery infections.

With regard to epidemiology, the water supply is in no way responsible. There is a heavy infection among

the Indian population in the cantonment with the bacillus of Flexner, and this is passed on by them to the European population by direct contact, handling of foodstuffs, etc., throughout the year. At certain seasons, especially during the race meetings, the cantonment becomes very crowded and conditions become especially suitable for the transference of the infection. "The existing sanitary arrangements in Poona are absolutely ideal for the spread of bacillary dysentery" write the authors, with unconscious humour. The latrine system is one of open pans, the contents of which are nominally collected by carts twice a day, and remain exposed to the air for the remainder of the 24 hours. The Manick Nullah between the city and cantonment is practically one vast open latrine. During the racing season some 1,200 horses and their syces are accommodated in stables within the cantonment, and the syces scatter the infection further afield. The average for the year of constantly sick from bacillary dysentery was 2.84 per mille for British troops and 1.88 for Indian troops.

Flies were found to be of great importance in the spread of the disease. The curve of fly prevalence runs parallel with that for dysentery and diarrhoea, with a high peak in August, until September, when the number of flies rapidly drops off, largely due to epidemic infection of flies with a fungus, *Empusa musca* in all probability. "Bacillary dysentery" cases, diarrhoea cases, and flies are present in Poona throughout the year, and largely rise and fall together." On 3 occasions out of 8, batches of wild flies caught in the cantonment gave cultures of the bacillus of Flexner from their intestinal contents. The flies pick up the infection from the open latrine pans through the cantonment and from the latrine area of the Manick Nullah and scatter infection with bacillary dysentery throughout the cantonment. Contact infection is also important, and many cases occurred where mothers attending on children suffering from *B. flexner* infections contracted the infection. On a general examination of the sera of troops in the station, no less than 31.8 per cent. of British troops showed agglutinins to the bacillus of Flexner present in significant titre, and 50.6 per cent. of Indian troops. Shiga agglutinins were only found in 3 out of 187 persons examined. One of the chief sources of danger is the bacillary carrier who is in relatively good health, and who does not notice the fact that he constantly passes a slight amount of mucus in his stool.

The second section of the paper is devoted to an analysis of the bacteriological findings. A good description of the technique employed is given; the importance of having the McConkey plates dry before inoculation is emphasised, and the value of Teague and Clurman's glycerine-saline solution for the preservation of dysentery bacilli in stools noted. Agglutinins against the bacillus of Flexner appeared in 72 per cent. of the series of cases tested and in 57 per cent. of "dysentery group" cases also. The agglutinins appeared about the 12th day of the disease and were at highest titre about the 23rd day after the onset of the disease. The severity of the attack bore but little relationship to the production of agglutinins. Agglutinins to the bacillus of Shiga were absent from all Flexner bacillus infections studied, whilst agglutination was strongest against the Flexner V of the five strains examined.

As is well known, and further confirmed in the present paper, many Flexner bacillus strains do not agglutinate with the specific antiserum when first isolated, but acquire the property of agglutinability when sub-cultured. Of 117 strains isolated 71.7 per cent. only were agglutinable to the five Flexner strains after many months of sub-culture. Eight hour readings on the water bath at 55°C. in place of the usual four hour readings, improved and reduced the number of inagglutinable strains by 15 per cent. Only 51 per cent. of agglutinable strains could be suggested to one or other of the five standard Flexner types given in the Medical Research Council Special Report No. 42. Inagglutinability and lack of agglutinogenetic power appear to be closely related to one another. Evidence was found of

at least one strain with apparently no antigenic relationship to the five Flexner strains, and there are probably many others; thus showing how wide a variety of constituent races go to make up the "Flexner bacillus" group of bacteria.

* * * * *

Major Manifold and Assistant Surgeon de Monte are to be congratulated on an exceedingly interesting and important contribution to our knowledge of the dysenteries of India, whilst the indications for sanitary reform in Poona cantonment are obvious.

Quinine-Stovarsol in Benign Tertian Malaria.

In the January 1928 number of the *Indian Journal of Medical Research*, Major J. A. Sinton, v.c., i.m.s., continues his studies in the treatment of malaria, in conjunction with Major W. Bird, r.a.m.c., and Military Assistant Surgeon S. N. Eate, i.m.d. The tests were carried out on cases of benign tertian malaria among British troops at Kasauli.

Stovarsol, which is stated to be acetyl-oxyamino-phenyl-arsenic acid, was originally prepared by Fournau in 1924, and has now been on the market for some time as a drug for the treatment of and even prophylaxis against syphilis, amœbiasis, relapsing fever, and malaria. In previous studies Major Sinton has shown that it has a markedly destructive action on *Plasmodium vivax*, but that it does not prevent relapses in benign tertian malaria. Hence the suggestion to combine stovarsol with quinine for oral administration, the new compound having been prepared by both the Haco Company of Berne and Messrs. May and Baker, London.

As in his previous work, Major Sinton relied on the diagnosis of "relapses" by finding malaria parasites in thick films of the peripheral blood taken once a week for eight weeks after the cessation of all treatment. The same author has also previously noticed the possible provocative action of stovarsol, when administered by itself and without quinine; daily doses of 1 gramme being liable to provoke a febrile response with appearance of parasites in blood films.

With quinine-stovarsol no toxic action was observed. The authors conclude as follows:—

"Under the conditions of our work (at Kasauli) stovarsol seems to be a useful adjuvant to quinine in the treatment of malaria. The compound quinine-stovarsol does not seem to be more efficacious than the two drugs given simultaneously, but it is more easily administered. It is possible that if larger doses of both quinine and stovarsol were given during the first week of treatment, followed by a course similar to that described in this paper, better results against relapses might be obtained, especially if the amount of quinine was increased."

(Any medical practitioner who has worked in India for a number of years must have been forced to recognise the value of the administration of arsenic, not so much in the direct treatment of a malarial attack, as in the follow-up treatment after quinine therapy. Stovarsol is a most interesting compound. Dobell and Laidlaw have shown experimentally that in amœbiasis it is far less efficient than emetine as an amœbicide, yet it has a distinct value—in the reviewer's experience—in the follow-up treatment of amœbiasis, whether after a course of emetine injections for the treatment of acute and sub-acute amœbic dysentery; or after a course of bismuth emetine iodide in the treatment of chronic amœbic infection. The high content of the drug in organic arsenic which appears to be readily absorbed seems to render it of distinct hæmatin value, and its real value may perhaps not be due so much to any direct parasitocidal action as to its general value in raising the patient's resistance.)

A Comparative Study of the Action of the Cinchona Alkaloids on the Uterus.

By R. N. CHOPRA,

LIEUT.-COL., I.M.S.,

J. C. DAVID, M.B., B.S.,

and

B. B. DIKSHIT, M.B., B.S., D.P.H.

(*Indian Journ. Med. Res.*, 1928, Vol. XV, No. 3, p. 571.)

THERE has for many years been an impression that quinine, when administered to pregnant women suffering from malaria, may lead to miscarriage. To some extent this is true, although it is far more true that the malaria itself may cause miscarriage, and malaria in pregnant women should be just as thoroughly treated with quinine as in other patients, though dosage may have to be reduced and the treatment proceeded with more gradually.

In this connection the present paper is of special interest, for the authors are clearly inclined to attribute the oxytocic or abortifacient action of quinine to contamination with quinamine. Having experimentally investigated the stimulant action of the different alkaloids of cinchona bark on the uterus of the cat and guinea-pig, they conclude that the uterus of the guinea-pig is more sensitive than that of the cat. The hydrogen-ion concentration of the fluid in which the different alkaloids act may affect results; the cat's uterus works best at a pH of 7.6, and that of the guinea-pig at a pH of 7.2. In general, the dextrorotatory alkaloids have a more powerful effect than the lævo-rotatory ones. The most powerful alkaloid of all is quinamine.

Quinamine in dilutions even as high as 1 : 500,000 causes marked tonic contractions of the isolated virgin, pregnant, or multiparous-pregnant uterus; doses of from 2 to 5 mgms. may send this organ into almost spasmodic contraction. With regard to the different cinchona alkaloids hydrocupreidine and hydrocupreine and cinchonine come next, whilst quinine and quinidine come low down on the list. "The oxytocic action of quinine is quite pronounced when the uterus is nearly full-term, but in early cases of pregnancy, beyond slightly increasing the amplitude of the automatic movement, no untoward effect is likely to be produced. This is also borne out by clinical experience." In brief, it is suggested that any abortifacient effect of quinine may be due to its containing a slight amount of quinamine.

Malaria in Coorg.

By T. C. McCOMBIE YOUNG, M.D., D.P.H.,

LIEUT.-COL., I.M.S.,

and

ASST. SURGN. J. D. BAILY, I.M.D.

(*Indian Journ. Med. Res.*, 1928, Vol. XV, No. 3, p. 745.)

IN Southern India, on the top of the Western Ghats, lies Coorg, the smallest Province in British India, with an area of 1,600 square miles. Both its climate and its races are peculiar, whilst it is the seat of an important coffee plantation industry. In 1878 Coorg had a tremendous reputation in the coffee world, for no less than 70,000 acres were under plantation by coffee. In 1883 however a decline commenced, and in 1901 the area under plantation had been reduced to 58,393 acres. In 1917 the coffee industry reached its lowest level, when a further decrease of 24 per cent. was recorded in the area planted. Then a Government loan stepped in and of late years the coffee industry in Coorg has revived to some partial extent.

The population of Coorg reached its maximal figure, 180,607 in 1901; thereafter there was a definite decline. To some extent the influenza pandemic of 1918-19 was responsible for this, but in 1921 the Superintendent reports that this will not account for the whole of the decline. The staple food of the community is rice, the population in general have a fairly high standard of life, conditions are comfortable, and the decline is due to one main cause—malaria. Coorg must be classed as a hyper-endemic malarial area, whilst blackwater fever is also prevalent.

The areas especially investigated in this enquiry were Mercara, the capital of the Province, with a population of 5,600 inhabitants, situated nearly 4,000 feet above sea-level; Verajpet, a municipal area in the southern part; Gonikoppal, a hamlet where a weekly bazaar is held; Somwarpet, a village situated on a high ridge; Fraserpet, a village in the Cauvery Valley; and the coffee estates. The spleen rates found were 55 per cent. for Mercara, 84 per cent. for Verajpet, 79 per cent. for Gonikoppal, 49 per cent. for Somwarpet, 65 per cent. for Fraserpet, whilst the general endemic (parasite) index for the whole Province worked out at 47.6 per cent. Crescent carriers constituted 14.6 per cent. of the total infections. These are clearly conditions under which malaria may be expected to become hyper-endemic, and account for the conditions present.

In order of prevalence, the important anophelines present are *A. listoni*, especially prevalent in open surface drains; *A. maculipalpis*, found in running water and in seepage water and tanks; *A. culicifacies*, found in many different breeding places; *A. minimus*, found in association with *A. maculipalpis*, *A. jeyporiensis*, *A. vagus*, *A. subpictus*, and others. The annual mean relative humidity is about 80 per cent. and the mean monthly minimum temperature does not fall below 56.7°F. The country in brief is one which resembles the Garo Hills in Assam, but appears to be free from kala-azar.

Recommendations.—The report is based upon observations which were carried out over a period of only five weeks, and is therefore but a partial one. Yet it is of special interest in its recommendations. The municipal drains in Mercara are apparently its chief source of *A. listoni* breeding and of its malaria. The wells are quite clear of anopheles larvae and therefore not dangerous. Complete eradication from such a hyper-endemic area cannot be hoped for, but a considerable reduction in its malarial incidence is possible. Propaganda work and the introduction of mosquito nets are urgently called for; the latter especially, seeing that the employees on the coffee estates can well afford nets of cheap pattern. A peculiar feature of Coorg is that for many years after 1862 it was the centre of a cinchona plantation, but by 1902 the cinchona industry in the Province had died out, and has never been revived.

The authors believe that in the revival of cinchona plantations in Coorg lies the chief solution to the malaria problem in that Province. Investigations of recent years have shown that all the cinchona alkaloids are almost equally efficacious in the cure of malaria, and former civil surgeons and officials in Coorg have recommended the cultivation of cinchona. The soil and climate of the Province are eminently suitable; it was once an important centre of cinchona cultivation; in brief, "every inhabitant, his own cinchona tree" would appear to be the best remedy. He can make a decoction of the bark. "Subject to expert advice from those personally conversant with the business of febrifuge production" write the authors, "we would incline to think that the production in Coorg of febrifuge for provincial needs is a proposition which is within the range of practical politics, more especially as its main object would be that of demonstrating how a cheap remedy for malaria could be placed at the disposal of a population, more than half of whom are, to judge from the spleen rates, permanently in need of it."

* * * * *

A most interesting and stimulating paper (though it would have been improved by the publication of a

summary of the findings). Coorg is clearly a hotbed of malaria; yet the Province can grow her own remedy for the conditions present. There must be few areas in the tropics so favourably situated, riddled with malaria, yet eminently favourable for the local output of cinchona febrifuge. Cause, effect, and measure for prevention are all present simultaneously.

The Liver Function in Sprue.

By S. S. SOKHEY, M.D.,

MAJOR, I.M.S.,

S. K. GOKHALE, M.Sc.,

M. A. MALANDKAR, M.Sc.,

and

H. S. BILLIMORIA, M.D., B.S., D.T.M.

(*Indian Journ. Med. Res.*, 1928, Vol. XV, No. 3, p. 553.)

It has long been a doctrine that in sprue there is serious impairment of the liver function. Diminution in size of the organ is constantly present in the later stages of the disease, and it has been assumed that, with this diminution, there is grave impairment of liver function.

Major Sokhey and his colleagues have experimentally investigated this theory by laboratory tests at the Haffkine Institute, Bombay, on thirteen cases of the disease. Their conclusion is that hepatic functions are not depressed in sprue, except perhaps in its terminal stages, and this finding will surprise many of the orthodox. Their summary of their work is as follows:—

"Thirteen cases of well marked sprue have been studied. Nitrogen partition does not reveal any inefficiency of the liver. The bromsulphalein dye retention test has given negative results, except in one case in which it may well have been due to the extreme lowering of the vitality generally on account of the approaching dissolution—the test was done three days before the patient died. Increase in the serum bilirubin in six cases, as shown by the indirect van den Bergh reaction, indicates increased destruction of erythrocytes rather than defective function of the liver. If the liver had been at fault, the dye test would have shown a parallel retention. Seven cases gave abnormal levulose tolerance curves, but on account of the non-specific nature of this test, and negative results yielded by the other tests, we cannot interpret our abnormal curves in terms of liver inefficiency. In sprue, inanition may more likely be responsible for the abnormal levulose tolerance curves rather than the condition of the liver..... Our investigation, therefore, shows that in sprue the liver is not affected to such an extent as to show impairment by liver function tests."

The true aetiology of sprue is so mysterious that even a definite negative finding in such an investigation has considerable value in excluding theories as to the causation of the disease.

The Sidney Rowson Wilson Prize.

We are asked by our contemporary, the *British Journal of Anaesthesia*, to publish the following particulars with regard to this prize. It has been instituted in memory of Mr. S. R. Wilson, who died some months ago whilst undergoing certain experimental tests with reference to anaesthetics upon himself.

Competitors should send their reports to the Secretary, the *British Journal of Anaesthesia*, "Ainsdale," Palatine

Road, Withington, Manchester, England, to be received before December the 1st, 1928.

As announced in the January number of the *British Journal of Anaesthesia*, for the best Inhalation Anaesthesia Research Effort, worthy of a premium, carried out by a citizen of the British Empire between the present date and December 1st, 1928, a prize of Fifty Pounds is offered.

Every competitor is expected to conform to the following regulations:—

(1) To forward to the Secretary of *British Journal of Anaesthesia*, on or before the first day of December, 1928, a typewritten report of his or her work, in triplicate, with a *nom de plume* thereon, and also accompanying same a sealed envelope having the same *nom de plume* inscribed on the outside and his or her name and address within.

(2) All competitors assign to the *British Journal of Anaesthesia* all rights of publication.

(3) The *British Journal of Anaesthesia* reserves the right to decide if any effort received is of a sufficiently high grade to warrant the award.

Reviews.

ABRIDGED REPORT ON MALARIA IN THE ASSAM TEA GARDENS.—By C. Strickland and K. L. Chaudhury. Published by the Indian Tea Association.

THE first quarrel that one has with this publication is that it is 'abridged.' This is not the fault of the authors, but of the Indian Tea Association. This is the more extraordinary when one considers the excellent style of the Association's series of scientific reports, dealing with the agricultural problems of the industry, and makes one imagine that in their eyes diseases of their product are more important than diseases of their producers. Consequently, wherever the authors' meaning appears obscure, the reviewer must always feel that the omission of important tables and charts must be heavily allowed for.

The second quarrel is likewise perhaps captious. The authors are writing for those engaged in the tea industry more than for their scientific brethren, but unless the latter are fully conversant with the topography and vernaculars of the tea area, much must remain obscure that otherwise would have been helpfully explained in a preliminary chapter dealing with the terrain surveyed, and hence the value of the report to those engaged on similar work elsewhere is correspondingly lessened. None the less the report is full of interest to the practical malariologist.

However, there are many apparently contradictory statements which the authors might easily have elucidated. For instance, though they mention the futility of ascribing to a garden the spleen-rate of recently imported children, and state that until two years' residence has been achieved this index is not representative of the results of local residence, yet their table on page 7 seems to bring out the fact, most important if true, that over a large number of imported as against garden-born children the rates are practically equal, presumably irrespective of length of residence in the former. Similarly, after reading that there is a very fair correspondence between a garden's local reputation for 'malariousness' and its actual spleen-rate, one recollects the directly contradictory statement on the preceding page that there is no relationship between these facts.

Again, on pages 89-90 there are apparently contradictory statements regarding the harmlessness of *khet* land, whilst the last two lines and the footnote on the former page directly contradict one another without a further explanation being added to the footnote. Similarly, the caption to fig. 13 and the first line on page 107 opposite are directly contradictory. Discrepancies such as these can hardly fail to impress most unfavourably the practical man who will study the report. Certain it is that such apparent contradictions are always being discovered in scientific work, but when writing a report of this nature the reviewer considers that it is essential to constantly bear in mind the fact that those for whom it is written are not scientists, but do expect the scientists they employ to report clearly in terms intelligible to them. The report loses most of its practical value owing to these discrepancies.

From the scientific view-point, however, there is much of interest. The discussion on pp. 10-14 on carrier species is good, but the total list of Assam Anophelines should have been included here, instead of in part III, where it can only be found as a table in the contents page of that section. The decision to proceed on the assumption "once a carrier, always a carrier" is sound practically, however much one may regret the present unsatisfactory evidence against many species so ably summarized recently by Covell. None the less, the reviewer does not altogether understand the attitude taken up by the authors in regard to their practice of 'lumping' several species together for tabulation purposes. Nothing, in his opinion, could be more fatal to practical results than the lumping (as illustrated on p. 15) of *culicifacies* with *rossi* and *vagus*. The two latter can be neglected everywhere, the former is one of the worst carriers in India. Nor is the necessity for this apparent. It is only the veriest tyro, or a most careless worker, who will fail to separate *culicifacies* and *vagus* (we agree with the authors that true *rossi* is probably absent from Assam). Either the staff employed could identify, or they could not. From the comments on p. 17 one gathers that the staff were not altogether satisfactory, but unless trust can be put in their capacity to carry out plain scientific diagnosis, the survey should never have been put through, for one table on p. 16 shows that 40 per cent. of the total catch consisted of this eminently unsatisfactory mix-up of species. Similarly so in the case of *sinensis* and *barbirostris*. In regard to the latter there is, to our mind, as yet no justification for implicating it as a practical carrier species, with all the particularly difficult control problems that this envisages. It is admittedly associated with *funestus*, and when in company with the latter can be attacked *pari passu*, but breeding when not so associated in our opinion can be neglected. The authors agree with the reviewer as the negligibility of *fuliginosus*, a far more commonly condemned species than *barbirostris*. On p. 92 *karuvari* is given as a reputed carrier. On whose authority? We have always followed Hacker, who alone seems to have investigated the point, in neglecting it.

The authors find that there is no apparent operation of what Christophers and Covell have called the 'economic factor' in the malaria causation of tea gardens. This is in accordance with the reviewer's experience, and only indicates how the yet-to-be-made attempt to control malaria among a truly rural population where this factor operates is going to be more difficult than any attempt so far made in India.

A very interesting point, deeply affecting all large scale survey work, is whether there is much seasonal fluctuation in the spleen-rate in hyper-endemic areas. The authors think not, but it appears by no means certain by whom the rates were taken. On p. 79 the footnote throws doubt on the accuracy of some such. To be comparable, spleen-rates are emphatically a job for a few thoroughly trained observers, not under any circumstances for Sub-Assistant Surgeons without special training.

This is admittedly a general survey, but it is full of remarks showing how futile it would be to base any

practical work or expenditure on generalities. Whilst we agree with the dictum that the smaller the stream the more is its malarious potentiality, this is to some extent contradicted by the fact that a very small stream probably dries off very quickly. The authors state that their knowledge is deficient on such points.

Nothing is said concerning the length of the transmission period in the various parts of the area surveyed, and yet there are probably enough meteorological records available to generalize. It may be that the smallest and most dangerous streams only flow during the transmission period, in which case they could in any case be neglected during the rest of the year; it may be that the transmission period extends over nearly all the year in which case the life of streams and wet weather swamps could only mark exacerbations in the general intensity of transmission. Meteorological factors of this nature could well have been added to the descriptive preliminary chapter that we have shown to be such a desideratum.

The remarks on siting habitations are applicable, not only to the tea garden, but to every industrial undertaking throughout the East. The unfortunate sanitarian is invariably invited to do his best to rectify the mistakes of those of other professions who have made decisions outside their proper domain.

On p. 114 the astounding remark is made that sub-soil drainage is not 'practical politics' in Assam. May we ask why? Who said so, the malarialogist on technical, or the planter and his managing agents on financial grounds? Photo after photo in the report shows sites where subsoiling would certainly appear to be a practical solution. Perhaps the 'crabsticks and mugwumps' referred to in part VII have made the decision!

Finally, we concur with the authors that better medical statistics, and a card-index of the medical state of each coolie should be prepared and kept in future. Half the financial loss caused by disease is not appreciated through the inability of the medical profession to furnish statistics, and in any case, be it whispered, to the general dislike of that profession to the handling of such.

R. S.-W.

CHRONIC CONSTIPATION.—By J. Ellis Barker. London: John Murray, Albermarle St., W., 1927. Pp. 503. Price, 7s. 6d.

This book is really a presentation of the teaching of Sir W. Arbuthnot Lane. It presents a 'gruesome' picture of the evil effects of intestinal stasis caused by unsuitable diet. The book consists very largely of selected extracts from the works of well known authorities, and regarded as a case "for the prosecution" it must be regarded as very complete and damaging. There are over-statements which create an unfavourable impression, for example "where constipation is universal, pyorrhoea, tonsillitis, and cancer of the stomach and bowel are also universal."

Again there is a statement which ought to be greatly qualified. "Disease is caused not so much by certain micro-organisms as by the weakening of our tissues and organs consequent upon our faulty methods of living." This may be true of certain diseases, it is certainly not true of small-pox, malaria, yellow fever and a host of other infections. Written for the purpose of frightening the layman such exaggeration may be good politics, but it creates an unfavourable impression on the minds of scientists. Apart from this general defect of the book, it can be warmly recommended as stating very forcibly the reasons for believing that unsuitable diet causes stasis and is responsible for a vast amount of disability. There is little fear of the medical man being misled by the exaggerations contained in the book and for this reason it is desirable that Mr. Barker's graphic indictment of constipation should be widely read. The general public will probably be thoroughly frightened and perhaps the result will be a wholesome

reform in the dietary of some of the millions who are constipated. Europeans in India are probably greater sinners in the matter of diet than any others: a perusal of this book will be in their interests.

THE ERADICATION OF LEPROSY FROM THE WORLD.—By Ezra Bradford Stehner, M.A. Cuttack: Orissa Mission Press. Pp. 175. Price, Rs. 5.

THE aim of this book as stated by the author is "to discover a solution for the eradication of leprosy from the world." The book might more accurately be described as an account of leprosy from certain points of view, such as history, mode of infection, and means of prevention by treatment and segregation. The greater part of the book is composed of quotations from the recognized authorities on leprosy: it contains a wealth of material which will be very helpful to lecturers and propaganda workers. A generous tribute is paid to the work of Sir Leonard Rogers, Dr. Victor Heiser and Dr. Ernest Muir, whose combined efforts have changed leprosy from an unspeakable horror to a disease which is usually amenable to treatment. One of the most remarkable of the tributes to the recent treatment for leprosy is contained in the story told by the Superintendent of a leper asylum. Some of the patients were singing at an unusual time of the day, and on being asked the reason for their rejoicing they replied that they "had met to praise God because once again we feel prickly heat." The book will be of considerable interest to all students of leprosy as it presents aspects of the disease which are not ordinarily found in textbooks. Those who seek for information on the diagnosis and treatment of the disease will not expect to find much to interest them.

PULMONARY TUBERCULOSIS: ITS ETIOLOGY AND TREATMENT.—By David C. Muthu, M.D., M.R.C.S., L.R.C.P. Second Edition. London: Baillière, Tindall and Cox, 1927. Pp. 503, with 33 original plates. Price, 12s. 6d. net.

THIS somewhat bulky book has reached its second edition. It contains much of the information which may be derived from most textbooks on tuberculosis and is well illustrated with 27 figures consisting of photographs, charts and diagrams. The main object of the book however seems to be to promulgate the theory held by the author that "the presence of the tubercle bacillus is not a decisive factor in the development of tubercular process..... There is no valid proof that the widespread prevalence of the disease is brought about in the majority of cases by its contagious character."

"All the pieces of suggestive evidence we have thus brought from various sources, when put together give us a right to surmise:

(1) That micro-organisms arise for the most part from within from the altered condition of the blood.

(2) That in turn these pathogenic organisms by a more favourable environment, can become saprophytes and harmless, which coincides with a return to health."

We have to confess that the evidence seems imperfect and is not such as would appeal to those who are familiar with laboratory technique and experimental methods.

The author has a somewhat complicated, philosophical style which is difficult to follow. The book abounds in poetry and platitudes and Latin quotations, but much useful information can be gleaned from its pages by careful perusal.

AIDS TO BIOCHEMISTRY.—By E. A. Cooper, D.Sc. (Lond.), F.I.C., A.R.C.S. (Lond.) and S. D. Nicholas, B.A. (Oxon.), A.I.C. London: Baillière, Tindall and Cox, 1927. Pp. viii plus 188, with 11 figures in the text. Price, 4s. 6d. net.

THIS small handbook is an addition to the popular "Student's Aid Series" and will be found useful by students going up for examination. The book deals

chiefly with the fundamental principles of biochemistry, structural and physiological. Theoretical discussions generally have been left out, only the more important portions being included. A previous knowledge of the subject is necessary to make the best use of the book. It also includes practical work for students.

The book can be recommended as a help to students revising the subject.

MODERN CLINICAL SYPHILOLOGY: DIAGNOSIS—TREATMENT—CASE STUDIES.—By John H. Stokes, M.D. London and Philadelphia: W. B. Saunders Co., 1926. Pp. 1144, with 865 illustrations and text figures. Price, 55s. net.

EVERYTHING from the pen of Professor Stokes is worthy of serious attention. This work is essentially a monograph which embodies the author's personal experience of thousands of cases of syphilis of all kinds seen both at Pennsylvania and at the Mayo Clinic. It is a veritable mine of information, and the practitioner in charge of a syphilis clinic will find in it everything he could possibly require. It is impossible in a brief review to give an adequate idea of the contents of so large a work. A leading feature is the inclusion of numerous case extracts, interspersed throughout the text, to illustrate various types of cases and common mistakes in diagnosis.

We may refer to some of the more salient points. His remarks on the diagnosis of the chancre are very important. He draws attention to the fact that the diagnosis of an early case of syphilis has undergone radical alteration in the last fifteen years. He refers to Fournier's large work in which 239 closely printed pages are devoted to a description of the clinical appearances of the chancre, which is now of academic interest only; he states "much of the factor of error now existing in the diagnosis of early syphilis is, I believe, the product of the survival of antiquated morphologic notions of the appearance of the chancre as an aid to diagnosis, and the persistence of the habit of teaching medical students the untrustworthy differential criteria of pre-spirochetal days. If the medical student will learn that there is no way to identify a genital lesion except by the dark field, the local and the blood Wassermann reactions, he will be a much safer servant of the public than with his present equipment of half-truths about induration, erosion, multiplicity, painlessness and so forth." In support of this he gives some excellent illustrations showing typical "chancres" which are however not syphilitic lesions at all. The Wassermann method described is that of Kolmer. A brief description of the precipitation tests for syphilis is given. His opinion on this point is "the basis of reference for their efficiency has, however, been the Wassermann test, and to a properly performed Wassermann test they remain thus far subsidiary, and on the whole less trustworthy." This is in agreement with our own views.

Among the wealth of illustrations we see none of chancres of the female generative organs.

In the treatment of anomalous cases, he agrees with the British view that diagnosis must precede treatment, and that if it be impossible to make a diagnosis at the moment, extremely watchful waiting must be carried out. He condemns treatment on a doubtful diagnosis, and takes the cautious view that if this is ever done, the course of treatment must be as thorough as if a diagnosis of syphilis had been definitely made. This question is however a difficult one, as if treatment be instituted very early, less treatment is required.

In the treatment of neuro-syphilis, while he agrees that there is real, though in experienced hands, slight risk to the eyes in the use of tryparsamide, yet he prefers this drug to malarial therapy, which in his opinion is by no means free from danger, and which he regards as a last resort. A good deal of space is allotted to intraspinal treatment. He is prepared cautiously to advise this in certain cases, as, though the margin of safety is small, the final results are in

his view better. He regards intraspinal therapy as definitely a specialist procedure, and not to be undertaken by the general practitioner. He considers that not enough use is made of serology to detect oncoming neuro-syphilis, and that too much use is made of laboratory tests in late neuro-syphilis in determined, though sometimes vain, attempts to remove persistently positive laboratory findings in a clinically non-progressive case.

This is a very fine book which will take its place among standard works on the subject. Our only criticism is that it is rather long. Some portions, particularly some of the earlier sections dealing with the generalities of clinical examination, might be considerably curtailed. The case records given increase the bulk of the book a good deal. Many of these are extremely instructive; others might be omitted. The absence of a bibliography is to be regretted. We think there is much to be said for the plan adopted by some recent authors of a short selected bibliography at the conclusion of each chapter giving reference to a few original papers of outstanding importance.

We have derived much benefit from reading this most excellent book—printed on good paper with splendid illustrations—by an acknowledged authority, and we heartily recommend it to every practitioner wishing to familiarise himself with the modern aspects of syphilis.

THE MODERN TREATMENT OF HÆMORRHOIDS.—

By J. F. Montagu, M.D., F.A.C.S. London: J. B. Lippincott and Co., 1926. Pp. x plus 296, with 116 illustrations. Price, 21s. Obtainable from Messrs. Butterworth and Co., Calcutta. Price, Rs. 15-12.

The author essays to bring before the reader the whole subject of hæmorrhoids, especially with regard to the modern treatment.

The first nine chapters deal with a description of the affection, its pathology and diagnosis. Seven chapters are set aside for the discussion of the various methods of treatment, therapeutic, operative, by injection, by radium, and electrotherapeutic. The last three chapters deal with complications, recurrence, etc., concluding with a bibliography.

A clear account is given of the author's method of treatment and other well-known authorities are referred to. The author favours the operative method for radical cure in suitable cases, but freely discusses the advantages and disadvantages of other procedures, whether prophylactic, palliative or curative. It is interesting to note that the "ligature with excision" method recommended for the radical cure of piles is almost identical with the operation adopted by Harrison Cripps many years ago; there can be no doubt as to the soundness of this procedure. It is wisely admitted that individual operators are justified in following various other methods, to which they have become accustomed. The more modern methods, such as by injection, by radium, or electrotherapeutic, are described and discussed.

Stress is laid on the importance of a simple routine and a full consideration of the feelings of the patient. There is ample evidence that the author's work is based on a large personal experience and the book can be confidently recommended to surgeons as a reliable guide.

The illustrations, diagrammatic and photographic, are clear and well-chosen. A feature which is annoying to some English readers is the American method of spelling. On page 139, the supine position is described as the "prone" position.

F. P. C.

PHYSIOLOGY AND BIOCHEMISTRY IN MODERN MEDICINE.—By J. J. R. Macleod, M.B., LL.D. (Aberd.), D.Sc. (Tor.), F.R.S. Fifth Edition. St. Louis: The C. V. Mosby Co., 1926. Pp. xxxii plus 1054, with 281 illustrations, including 9 coloured plates. Price, \$11.00.

The fact that a book has reached the fifth edition since its first publication in 1918 leaves little doubt

that it is appreciated. The real utility of this work lies in the fact that it appeals to all ranks of the profession who desire to keep in touch with advances that are essential in the practice of modern scientific medicine, whether of a theoretical or practical nature. The volume is well got up and the various sections are up to date. From the point of view of criticism it is possible that the scope attempted in the book is too ambitious and might be rendered more valuable by judicious curtailment. The book as a whole can be thoroughly recommended, not only to the consultant but more especially to practitioners and students who wish to keep abreast of the study of scientific medicine.

T. C. B.

THE QUEEN CHARLOTTE'S PRACTICE OF OBSTETRICS.—By the members of the staff of the Hospital. London: J. and A. Churchill, 1927. Pp. 692, with 4 coloured plates and 270 text figures. Price, 18s. net.

It is indeed with pleasure that we welcome this volume, the first to appear for a long time, representing the teaching and practice of the London School.

The book is excellently printed and illustrated, and bears the impress of opinions based upon practice, rather than on theory. The toxæmias and disorders associated with pregnancy, are particularly valuable chapters, and Section 7, dealing with pyrexia in the puerperium, is quite the clearest and most practical account of the subject that has been written in any textbook up to date. The premature baby is given a chapter to itself, and the chapter on the unhealthy baby cannot fail to be of use to all practitioners. Obstetric operations are dealt with in a separate section in the end of the book, whilst perhaps one of the most interesting chapters of all is the miscellaneous one which deals with such subjects as anæsthetics, pituitary extract, x-rays, and maternal mortality. The reviewer, who has delved through a host of Scotch, American, and Irish textbooks during the last few years, has no hesitation in stating that this is by far the clearest, and most practical exposition of the subject that he has had the pleasure of reading for a long while and is of the opinion that it is undoubtedly the best textbook for students in this country to buy.

V. B. G-A.

BASAL METABOLISM IN HEALTH AND DISEASE.—By E. F. Du Bois. Second Edition. London: Baillière, Tindall and Cox, 1927. Pp. 431, with 1 plate and 99 figures. Price, 22s. 6d. net.

A GREAT deal of importance is nowadays attached to the subject of basal metabolism. Previously, it was the physiologists, the biochemists and the research workers only who had to deal with the measuring of basal metabolism, and the author is to be congratulated on his attempt to bring this subject out of the realm of pure physiology into that of clinical medicine. The book is written in clear language and will be found useful to practitioners in medicine and surgery, as well as to medical students. The chapter dealing with the metabolism of carbohydrates, protein and fats is an interesting study and will be very helpful in getting a clear idea as to what changes are taking place inside the body during the metabolism of these food principles.

The author has discussed fully the general fundamental principles of the technique of the basal metabolism test and has described some of the principal apparatus used for the purpose, such as the Atwater-Benedict respiratory calorimeter, the Benedict cot chamber, the Tissot apparatus, Douglas' bag, Benedict's portable apparatus, etc. He has fully described the advantages, disadvantages and limitations of each kind of apparatus, which we consider to be a most useful section for those who have to do work of this kind.

The author has fully and clearly demonstrated the importance of determination of the basal metabolism

in various diseases such as diabetes, diseases of the thyroid, diseases of the other endocrine glands (adrenals, pituitary, sex glands, etc.) and the chapters dealing with this subject will prove very useful to every medical man. In addition, the basal metabolism in diseases of the blood such as primary and secondary anæmias, leukæmias, in cardiac diseases, in nephritis and in fevers has received careful consideration from the author.

We have no hesitation in recommending the book to the medical public.

DISEASES OF THE SKIN.—By Henry Hazen, A.M., M.D. Third Edition. St. Louis: C. V. Mosby Company, 1927. Pp. 572, with 248 illustrations, 2 in colours. Price, \$10.

THIS is one of the numerous excellent books on skin diseases: there must be an insatiable demand for books on dermatology, and some ingenuity must be needed to discover new features such as would justify the production of a fresh addition to the large family of dermatological publications. In the preface to the first edition the author had already disarmed criticism by announcing his adherence to the policy of excluding the rare diseases. The author has made a valiant effort to exclude the word eczema from the book and has nearly succeeded, but it is doubtful whether this procedure will be popular with the general practitioner. The attempt to give a rational classification of skin diseases cannot be regarded as being quite successful; for example, among the diseases due to emotional or organic nervous disorders are included urticaria, genital pruritus, alopecia areata, dermatitis artefacta, etc. Altogether it would appear to be premature to depart from the orthodox system of classification of the many diseases of unknown ætiology. The book is very well illustrated and will be found a useful addition to the libraries of the numerous medical men who learn best from looking at good pictures.

CATALOGUE OF INDIAN INSECTS, PART XII—TABANIDÆ.—By R. Senior-White. Calcutta: Government of India, Central Publication Branch, 1927. Pp. 70. Price, Re. 1-12 or 3s.

THIS catalogue of the Indian Tabanidæ, chiefly based on the previous work of Miss Ricardo, brings up to date our present knowledge of the distribution and synonymy of these insects. It contains a key to the identification of the several genera, and synoptic tables for the identification of the Indian species of each genus. It gives a good list of synonymy and a bibliography. This publication is of interest to the entomologist as also to veterinary, and possibly medical officers, since it deals with an important group of insect pests of live stock, some of which are transmitters of surra.

M. O. T. I.

OUTLINES OF COMMON SKIN DISEASES, INCLUDING ERUPTIVE FEVERS.—By T. Caspar Gilchrist, M.D. London: Ballière, Tindall and Cox, 1927. Pp. 54, with 60 figures in the text. Price, 7s. net.

THE want of a book on diagnosis of the common skin diseases has long been felt by students and medical practitioners. This study of dermatology in the Johns Hopkins University, U. S. A., by Dr. T. Caspar Gilchrist, M.D., for 20 years has resulted in the publication of a book entitled "Outlines of common skin diseases" which has tried to remove this long-felt want. The author has first of all given a good, brief classification of the common skin diseases. Then he has outlined his methods for diagnosis. Next he has detailed his methods of diagnosis by describing the ætiology, regional distribution, and characters of these skin lesions. He has laid much stress on two points, namely, the characters of the primary lesions and the regions of the body affected, and these two points are really the most useful guides for diagnosis. Finally,

to aid in the diagnosis, he has given a large number of diagrams which are essential and even more useful than written descriptions. He has completed the book by giving a suitable diet list. On the whole, the book is a most useful guide to lecturers and students, although, because in the tropics the incidence of common skin diseases is different, the book may not prove as useful in India as in temperate climates.

G. P.

THE ARTIFICIAL LIGHT TREATMENT OF CHILDREN IN RICKETS, ANÆMIA AND MALNUTRITION.—By Kathorino M. L. Gamgee, M.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd., 1927. Pp. xx plus 172, with 16 plates and 33 text illustrations. Price, 10s. 6d. net.

THIS is a thoroughly practical little book, written from the point of view of an Officer of Health for Maternity and Child Welfare.

In his preface Professor Leonard Hill draws attention to the ill-nourished child "whose stomach is overloaded with the wrong food at the wrong time," as well as the influence of "overstrain, lack of sleep and the quiet which so many poor and overcrowded homes lack." "The author," he writes, "has intimate experience of these homes, and this together with her practical experience of the treatment of children with artificial sunlight gives her book a high value."

After a description of the child of our big industrial areas there are chapters on rickets, sunlight—natural and artificial—and the therapeutic action of artificial light in children.

Part II deals with the practical and administrative organisation of a public health light clinic.

Parts III and IV are concerned with clinical, practical, and statistical problems.

While the book contains nothing new, as a symposium of the author's practical experience, it will be a great help to those contemplating the establishment of public light clinics.

PYEOGRAPHY: ITS HISTORY, TECHNIQUE, USES AND DANGERS.—By Alex. E. Roche, M.A., M.D., M.Ch. (Camb.), F.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd., 1927. Pp. xlv plus 118, with 16 plates. Price, 9s. net.

THE contents of this volume are based on 58 personally observed pyelographs at St. Peter's Hospital, London. After a brief history of the development of pyelography, there are chapters on technique, reactions, and complications after the operation, contra-indications, a radiographic study of the normal renal pelvis, and common indications for the operation. These are followed by an account of pyelography in the various renal conditions in which this procedure has been found to be of use. At the end of each chapter there is a short summary which will be found very useful for reference. The printing of the text, and reproduction of skiagrams leaves nothing to be desired and is worthy of the high reputation of the publishers. The work needs no further commendation than that given in the introduction by the distinguished urologist, Sir T. Thomson Walker, who writes: "The increasing number of surgeons who can safely carry out this method of examination, and the necessity that all those engaged in general practice should know the possibilities in diagnosis that it offers, make this monograph a welcome addition to surgical literature."

THE INVERT AND HIS SOCIAL ADJUSTMENT: AN ANOMALY.—By Anonymous. London: Ballière, Tindall and Cox, 1927. Pp. xxxii plus 160. Price, 5s. net.

IN his preface to this very remarkable little book, the author states that he hopes it may be of "particular use to those who find themselves at a loss to provide practical advice for patients or penitents of confused sex." The author, admittedly himself an invert, is

obviously a man of culture and deep religious feeling. Within the limitations imposed by his sex, race and religion, he has acquired a penetrating understanding of and sympathy with, sexual inversion. It will seem to some readers of this book that the author has perhaps shown more concern for the mental and physical welfare of male inverts than they either need or desire. Most male and nearly all female inverts, exhibit, in addition to what the author describes as a "definite *claw* of youthfulness," a singular complacency in their defect. It is on this latter account that they are so difficult to treat, in the medical sense. In his discussion of the causes and treatment of inversion, the author displays much common sense and no little wisdom, although, it must be admitted, he does not appear to appreciate fully the most recent findings of psychoanalysis in regard to homosexuality which lie probably nearer to the truth than do any other. Dr. Robert H. Thouless, lecturer in psychology in the University of Glasgow, has contributed a preface in which he expresses his own views as follows:—"We who are normally sexed must realise that the virtuous love of a homosexual is as clean, as decent, and as beautiful a thing as the virtuous love of one normally sexed. In other respects it is different in its biological uselessness as a means of continuing the race, in its impossibility of a satisfactory outcome, and in the unwisdom of even its most innocent modes of expression." The book deserves fully to realise its author's hope that it should, "through the agency of charitable physicians, clergymen or other advisers, find its way into the hands of many persons to whom it may be a source of comfort and encouragement."

O. B. H.

THE CATECHISM SERIES.—Edinburgh: E. & S. Livingstone. *Anatomy, Bones*; Fourth Edition, Part VI. *Physics*; Third Edition, Part II. Price, 1s. 6d. each plus postage.

We have dealt previously with several volumes of this excellent series of little handbooks, and the above two volumes recently issued are well up to the general standard of the series. The one on bones is very complete; and in 89 small pages covers the whole subject. Read in conjunction with a skeleton and a disarticulated skull, it should give the medical student a very sound knowledge of what is perhaps the most difficult subject in anatomy.

The complete series of these little books to date is as follows. Each part is sold at 1/6, plus postage.

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Veneral Diseases.—One Part. (Just Published.)

Zoology.—Three Parts. (Second Editions.) Or, in one volume, cloth, 4s. 6d. net. Post 4d.

New Part—in Preparation: *Diseases of Children*.

AIDS TO THE DIAGNOSIS AND TREATMENT OF DISEASES OF CHILDREN.—By John McCaw, M.D. (R.U.I.), L.R.C. (Edin.). Sixth Edition. London: Baillière, Tindall and Cox, 1927. Pp. viii plus 330. Price, 4s. 6d. net.

THIS is an excellent little book of 330 pages, filled with information which cannot fail to be of value to the general practitioner. It is thoroughly up to date with regard to infant feeding and rickets, and summarises the published verdicts of well recognised authorities on many special subjects, such as for instance "sleepy sickness," the Schick reaction, pyloric stenosis, acidosis, etc. The printing is excellent and the text has not been boiled down into the far too frequent telegraphic style of writing.

Dr. Allen, the new editor, is to be congratulated on a very distinct improvement over the 5th edition, and we feel sure that his efforts will be thankfully acknowledged by many medical practitioners all over the world.

THE PRESCRIBER'S COMPANION.—By M. P. Dikshit. Revised Edition. Published by the author at Kurwar, District, Sultanpur, 1927. Pp. viii plus 736. Price, Rs. 15-12.

THE book contains over 3,300 prescriptions under different heads of diseases alphabetically arranged, including prescriptions for children. It also contains a list of incompatibles, numerous useful tables, a section on toxicology with descriptions of symptoms, fatal doses, fatal period, treatment, and chemical tests. The book will be quite useful to general practitioners.

CHRONIC RHEUMATIC DISEASES: THEIR DIAGNOSIS AND TREATMENT.—By F. G. Thomson, M.A., M.D., F.R.C.P. and R. G. Gordon, M.D., D.Sc., M.R.C.P. (Edin.). Bombay: Oxford University Press, and London: Constable and Co., 1928. Pp. viii plus 202. Price, 8s. 6d. net.

THE authors have acquired a wide experience of these diseases at Bath and have evolved some order and system from the chaos, which has resulted from confused nomenclature. The term rheumatism has for years been applied to a variety of conditions differing widely in causation and pathology. The authors have set themselves the task of sorting out these conditions, and have given a very readable, and what is more a logical account, based on the pathology of the lesions. It is only in this way that sound treatment can be applied. The book is divided into three parts, clinical, diagnosis, and principles of treatment, and the ground is very thoroughly covered. In addition, treatment is outlined for all the various special manifestations described in the clinical part. This is one of the best books covering chronic rheumatic affections, including neuralgias and neuritis, that it has been our pleasure to have read.

ANATOMICAL, PHYLOGENETICAL AND CLINICAL STUDIES ON THE CENTRAL NERVOUS SYSTEM.—By B. Brouwer. London: Baillière, Tindall and Cox, 1927. Pp. xii plus 67, with 16 illustrations. Price, 11s. 6d. net.

THE HERTER lectures are delivered each year by some eminent foreign worker in physiology or pathology. The lectures have been published for many years in the *Bulletin of the Johns Hopkins University*, but last year they were issued for the first time in book form. Professor B. Brouwer of Amsterdam visited Baltimore last year to deliver the lectures. The professor is a clinician in neurology, but a perusal of this book reveals him as a physiologist, and a clinical pathologist as well.

He delivered three lectures and each of them is on a rather abstruse subject. The first is entitled, "The Projection of the Retina on the Brain." The lecturer first points out how experiences during the war renewed our interest in the cerebral organisation of the optic pathways. He gives full credit to the workers in the subject and mentions that many years ago Newton emphasised that in man the optic fibres only partly cross in the chiasma. He describes the anatomical differences in various animals, and then summarises the theories of the localisation of the retinal fibres proceeding to the brain that have been held by different authorities.

The lecturer describes his experiments and their results. The actual surgical operations on the eyes of animals were performed by Professor Zeeman. The operation performed was intricate and calls forth the admiration of the reviewer. The retina was injured with a cataract needle in a predetermined and definite area. This operation was carried out under general anaesthesia, and with the aid of an ophthalmoscopic lens of 20 dioptries the point of the needle and the fundus were always in view of the operator. The resulting degenerated areas of nerve tissue were examined post-mortem and many interesting results obtained.

The lecturer discusses these results, and undoubtedly adds much to our knowledge of optic localisation in the brain. The second lecture is entitled, "The Pathology of Sensibility" and this difficult subject is presented in a most interesting manner.

The importance of the study of comparative anatomy is emphasised, and many experiments are described. The value of intrathecal injections of lipiodol is explained. Since using this method for localising tumours of the spinal cord the surgeons have never failed to find the tumour at operation.

The third lecture is entitled "The Significance of Phylogenetic Studies for the Neurologist." It is at once apparent that the lecturer has always been very interested in the comparative anatomy of the nervous system. He shows clearly that such a study is of great importance in helping the investigator to understand the many problems with which he may be confronted. The book is well printed and the diagrams are very clear. It is difficult to judge the value of this book to the medical profession in India. To the neurologist and to the ophthalmic surgeon it should prove most interesting, for both of them will find aspects of their work presented in a most interesting and novel way.

H. H.

A TEXTBOOK OF CLINICAL NEUROLOGY.—By Israel S. Wechsler, M.D. London and Philadelphia: W. B. Saunders Company, 1927. Pp. 725. Illustrated. Price, 32s. 6d. net.

In a way clinical neurology may be regarded as the Cinderella of the system diseases in medicine. Recently great advances have been made in many directions, such as in diseases of the heart, the kidneys, the endocrine glands. These have not been accompanied by any corresponding advances in our knowledge of the nervous disorders. Consequently in taking up a new textbook of clinical neurology, such as the one before us, we do not expect to find anything very original in the subject matter. This holds good in the case of the present volume. In one important way, however, the author has departed from custom. Whether this departure is an advantage to the reader we take leave to doubt. The departure from tradition lies in the omission of the usual, and in our opinion essential, introductory chapters on the anatomy and physiology of the nervous system. The author maintains that these subjects can be learned more completely from special textbooks. This no doubt is true, but we believe that for a true and proper appreciation of neurology it is essential to leave this knowledge in its proper setting, and to keep constantly in mind and at hand for ready reference a complete map of the whole nervous system and its connections, particularly the motor and sensory paths. It must be available for instant reference and cannot be divorced from the

subject matter of the text. This can only be accomplished by incorporating it in the book. A knowledge of these requisite details, motor and sensory, is the open door to an intelligent comprehension of nervous diseases and a textbook without them is like a house without a door. The brief anatomical outlines given in some instances by the author by no means take the place of a collective anatomical survey.

The book is divided into five parts. The first part deals with the various methods of examination. The portion on the electrical examination of nerves and muscles is particularly good. The reaction of degeneration is clearly defined—a point of some importance. In sixteen years' teaching experience the reviewer has never met a student capable of giving a complete and correct definition of this reaction. Professor Wechsler's description should make the matter clear to the dullest. There is a mistake in the letterpress below Figs. 7, and 8. Fig. 7 is, of course, the anterior view and Fig. 8, the posterior. A full description of the new method of "chronaxie" for the diagnosis of muscle nerve degeneration is given. "Chronaxie" is the shortest duration during which a current of certain defined strength must flow through a muscle-nerve in order to produce a contraction. The current strength chosen as the unit of measurement is called the "rheobase." Measurement is made by means of electrical condensers. The method was introduced by the French and is likely to be of considerable value. In this part is included a useful section on the technique of lumbar puncture and the examination of the cerebro-spinal fluid. Part I concludes with a description of the psychometric tests, and their importance, apart from any question of mental defect, is stressed.

In Part II diseases of the spinal cord are discussed and a clear and concise account of them given. The section on the muscular atrophies is the least satisfactory portion of this part, and the classification given is not very helpful.

Part III deals with the peripheral nerves, Part IV with the brain, and Part V with the neuroses.

The book as a whole is readable and presents the somewhat dry facts of clinical neurology in an interesting manner. It is a book more likely to be of use to the practitioner than to the student, but can be read with profit by all interested. There is an excellent selection of references at the end of each section. The printing, binding and illustrations are faultless.

J. D. S.

A SHORT ACCOUNT OF THE ANTIQUITY OF HINDU MEDICINE.—By David C. Muthu, M.D., M.R.C.S., L.R.C.P. (Lond.). Second Edition. London: Baillière, Tindall and Cox, 1927. Pp. 52. Price, 2s. 6d. net.

THIS booklet gives a very interesting statement of the reasons for believing that Hindu medicine and Hindu civilization are of extremely ancient origin. The great antiquity of the Indo-Aryan civilization is well known, what is not clearly known is the region from which these worthies of old came. Perhaps it does not matter much whether they originated from the Punjab or from some more western land, at any rate it is clear that their manners, customs and beliefs approximated more to those of Europe than is the case among their descendants in India to-day.

Dr. Muthu deals with the various periods of life in India:—

- (1) From 6,000 B.C. to 4,000 B.C.
- (2) From 4,000 B.C. to 2,500 B.C. (the Rig Veda and Ayar Veda).
- (3) 2,500 to 600 B.C.—the Epic Period when the Indo-Aryans reached the height of their civilization. Charaka and Susruta flourished in this period.
- (4) 600 B.C. to 600 A.D.—The Buddhist period during which a decline set in, anatomy, dissection, and surgery being discouraged.
- (5) 600 A.D. to 1600 A.D.—the Arabian period during which Hindu medicine still further declined,

though it is claimed by some that much of the Arabian and European medicine was borrowed from Hindu sources.

Dr. Muthu's work should stimulate the present generation of Indian medical men to strive to restore the glorious past, by imitating the example of the great thinkers of the past. Would that Charaka and Susruta could be born again in India! They would certainly be in the van of modern research and would have little patience with those whose lack of initiative dishonours their distinguished predecessors. Let us do homage to the great physicians of old, by trying to make full use of all existing knowledge and experience: what we need is something of their spirit and enterprise, rather than a slavish return to their actual methods.

J. W. D. M.

MUSCULAR CONTRACTION AND THE REFLEX CONTROL OF MOVEMENT.—By J. F. Fulton, B.Sc., M.A., Ph.D. (Oxon.). London: Baillière, Tindall and Cox, 1926. Pp. xv plus 644, with 204 figures in the text. Price, 45s. net.

THIS imposing volume is a monograph concerned primarily with the activity of skeletal muscle, its mode of contraction, and the nature of its reflex control. The first part deals with the phenomena associated with contraction of the individual muscle fibre, and the second with the way in which the individual fibre responses are summated by the central nervous system into the postures of living organisms. Recent advances in the physiology of muscle and central nervous processes are fully described, and a detailed description is given of the torsion-wire myograph of Professor Sherrington, and its use in conjunction with the string galvanometer. A brief historical sketch of the physiology of muscle has been given in the introduction. This in itself is interesting reading, inasmuch as it deals with the life work of such great men as Aristotle, Galen, Galvani (to mention a few), by whom so little has been accomplished in comparison with what remains to be known.

One of the features of the book is the comprehensive bibliography, the references in which have been personally verified by the author. It is essentially a book for the physiologist, and as such should form part of the library of every one interested in the teaching of this subject.

J. A. S.

VENEREAL DISEASE: ITS PREVENTION, SYMPTOMS AND TREATMENT.—By Hugh Wansley Bayly, M.C. Third Edition. London: Faber and Gwyer, Ltd. Available from Butterworth and Co. (India), Ltd., Calcutta, 1927. Pp. 242, with 3 coloured plates and 74 illustrations in the text. Price, 10s. 6d. net, or Rs. 7-14.

THE second edition of this book was reviewed at length in our issue for October, 1924, and the appearance of a third edition is evidence of the demand for the book and of the desire of the author to keep abreast of modern developments. The general character of the work was sufficiently noticed in our former issue, so that it will suffice to remind the reader that it is essentially clinical and practical and is intended for the general practitioner. The student will not find the pathological aspect of the subject dealt with in sufficient detail for his needs, but for practitioners the work will be found a concise practical guide. The chapter on prevention will be useful, as practitioners often have to advise on this point, but it is somewhat overburdened with historical matter which is out of place in such a short manual. The space thus occupied would be better devoted to a more detailed account of the clinical features of secondary syphilis. The question of the diagnosis of active syphilis on the evidence of a positive Wassermann reaction alone, in the absence of history or clinical signs, is a difficult one and all will not agree with the author's views on this point, but until the technique of the Wassermann reaction and its interpretation have been absolutely standardised the question must remain open. The reviewer, working with the

same laboratory under standard conditions for some years finds that he can accept a positive Wassermann reaction alone as evidence of active syphilis, and has not yet seen a case in which patient treatment has failed to modify or reverse that reaction, thus justifying his contention. Considerable perseverance both on the part of patients and doctor is often necessary, and one cannot accept results from any and every laboratory, as the meaning of slight and doubtful reactions is different in patients with a proved history of syphilis and in those tested under suspicion. The essential point is that the laboratory should be in such close touch with the clinician that doubtful points of this nature can be cleared up by personal reference; if this condition is fulfilled most of the difficulties in the interpretation of the Wassermann reaction will disappear. The author does not see any advantage in the use of intramuscular arsenical injections because they are often slightly painful, but it is in these cases of persisting positive reactions that intramuscular injections have proved their great superiority over intravenous injections. The long period of observation advised for cases of syphilis—10 years—is rarely practicable, but the author's view on the marriage question are eminently reasonable.

The treatment of general paralysis of the insane by malarial therapy, by protein shock and by trypanamide is considered in sufficient detail and there are sections on the use of diathermy in both the male and female. The exaggerated claims which were made for this treatment when it was introduced are assessed at their true value and its real field of usefulness is indicated. There is a mistake in the description of the diathermy apparatus, a rotary converter is necessary if the supply current is a direct one and not for alternating current as stated. The illustrations are well reproduced, particularly the three coloured plates the sources of which are duly acknowledged.

W. L. H.

PRACTICAL GASTROSCOPY.—By J. Rachet, M.D. Authorised translation by F. F. Imlantoff, D.Sc., B.A., M.R.C.S. London: Baillière, Tindall and Cox, 1927. Pp. xii plus 146, with 10 plates and 48 figures in the text. Price, 15s. net.

THIS little book is essentially one for the expert, and although the translator states "it is not yet possible to claim gastroscopy as a method of routine examination, yet it has become a daily possibility," we are inclined to disagree. In the first place a very careful selection of cases has to be made; and of the selected cases in only about one-third can the lesion be recognised, and then only by one who has had considerable experience of the method. The practical value of such a method of diagnosis must be very small. This book itself, however, is interesting reading. The style is lucid, and it is well illustrated. It can be recommended to all those who are interested in that branch of optics which has for its object the illumination of the cavities of the human body. Indeed the author can be congratulated on having made an intensely interesting contribution to medical science.

A MANUAL OF SURGERY (ROSE AND CARLESS) FOR STUDENTS AND PRACTITIONERS.—By Albert Carless, C.B.E., M.B., M.S., F.R.C.S. and C. P. G. Wakeley, F.R.C.S. (Eng.), F.R.S. (Edin.). Twelfth Edition. London: Baillière, Tindall and Cox, 1927. Pp. xii plus 1544. Illustrated. Price, 30s. net.

THIS well known surgery, familiar to every student for the last thirty years requires no further notice than the fact that, after three years, a new edition is necessary.

There is a slight increase in the illustrations with however a slight reduction in the total number of pages. The chapter on anaesthesia has been revised and is well worth perusal. The preface contains a long eulogy of Lord Lister and his work and is well worth reading. A feature of this new edition is the attention paid to emphasizing the initial symptoms of disease rather than

the terminal phenomena. This marks a distinct and necessary advance in surgical textbooks and for this reason alone the student and practitioner should obtain the new edition and discard the old one.

There are some beautifully coloured plates.

H. B. S.

A SYNOPSIS OF SURGERY.—By Ernest W. Hey Groves, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.). Eighth Edition. Bristol: John Wright and Sons, Ltd., 1927. Pp. 674, Illustrated. Price, 17s. 6d. net.

THE book is of great help to the student for the purpose of a quick revision of a bigger textbook before an examination. It will also be found useful by the general practitioner in quickly refreshing his memory, as the book though brief is both readable and comprehensive. It is the most excellent and complete synopsis of surgery that we have so far seen.

THE INJECTION TREATMENT OF VARICOSE VEINS.—By A. H. Douthwalte, M.D., M.R.C.P. (Lond.). London: H. K. Lewis and Co., Ltd., 1927. Pp. viii plus 39. Price, 3s. net.

THE little pamphlet is both interesting and instructive. The description of the technique of the injection method of treatment of varicose veins is very lucid. This method should be given a thorough trial by all surgeons, as the operative method of treatment is still far from satisfactory. The book may strongly be recommended to all practising medical men.

THE PRINCIPLES OF ANTE-NATAL AND POST-NATAL CHILD HYGIENE.—By W. M. Fieldman, M.D., B.S., M.R.C.P. (Lond.), F.R.S. (Edin.). London: John Bale Sons, and Danielsson, Ltd., 1927. Pp. xxiv plus 743, with 161 illustrations and 14 plates. Price, 25s. net.

THIS is the most complete textbook on the subject of child hygiene that we have yet seen. No aspect of the subject is left untouched. The author has a wide knowledge of child hygiene and communicates his knowledge in an easy but elegant, literary style. Despite the detail, it is a very readable book. The illustrations are numerous and add greatly to the interest of the book. The history and development of child hygiene is dealt with in the opening chapters; to ante-natal, inter-natal and child mortality there are devoted four chapters. A clear description of heredity and environment in relation to child hygiene is given. Antenatal hygiene is discussed physiologically and pathologically. It would serve little purpose to detail farther the headings of chapters, but we can assure our readers that they will find complete up to date information on every point of child hygiene given in an interesting but at the same time authoritative manner. Every one interested in the subject practically or theoretically should be in possession of this book. The quotation on the title page is apt:—

"Are you not risking the greatest of your possessions? For children are your riches, and upon their training for well or ill depends the whole order of their fathers' house."

THE EVOLUTION OF PREVENTIVE MEDICINE.—By Sir Arthur Newsholme, K.C.B., M.D., F.R.C.P. London: Baillière, Tindall and Cox, 1927. Pp. xv plus 226, with 6 plates. Price, 11s. 6d. net.

THE value of the study of history and historical appreciation in political and national matters has long been recognised; it is but lately however that the history of medicine has received its proper place in the medical curriculum. Many leading schools have now chairs in the History of Medicine, and students have an opportunity of appreciating the steps by which medicine has become a rational science, and of the lines along which it is now proceeding and likely to advance. Sir Arthur Newsholme is well known as a medical author, and in addressing himself to the task of writing a short history

of the evolution of preventive medicine he has placed the profession under an obligation. A history of preventive medicine is much needed, but Sir Arthur found that the task was so formidable that he had to be content with a shorter sketch than he originally had intended writing. But the shorter book will probably reach a wider circle of readers than the larger volume.

The author points out that the proper place of preventive medicine is alongside curative medicine. Only when we understand fully the causation and the remedy for disease can we approach the task of prevention with assurance. The principles of preventive medicine are closely bound up with the history of medical science and the story is an entrancing one to look back on. It is one of a constant fight of originality versus authority. As has happened in most religions, so in medical science sacerdotalism and priestcraft in authority and dogma have always stifled advance and have often done the original founder much harm. To demonology and to wrathful offended deities for long were attributed all the diseases and epidemic outbursts of the plagues that have afflicted mankind. Hippocrates was the first to break away from the fetters of supernaturalism; and Aristotle and Plato were among the first exponents of the application of reasoned intelligence to disease. Galen, while forming the culminating point of Greek medicine and apostle of experimentation, was at the same time the leader of extreme unfounded dogmatism, and his presumed authority for centuries opposed all progress.

The early Christian priesthood, through a misreading of Christ's teaching, underrated this mortal life, and for about 1,200 years priestcraft, charlatanry, impostures and saintly charms masqueraded as medicine.

Roger Bacon (1214) was a light born out of his time. Paracelsus (1500), himself a bit of a charlatan, broke the ice of authority, while Galileo and Copernicus achieved the emancipation of reason which has gone on since.

In England Harvey and Francis Bacon lit the lamp of experimental philosophy which will now never be dimmed. Bacon's great service was in helping to release mankind from the obsession of untested doctrines. The further history of science, philosophy, and medicine, curative and preventive, is a fascinating story which Sir Arthur Newsholme delights in the telling. England can be proud of her part in this story; Harvey, Sydenham, Baker, Farr, Pringle, Mead, Boyle, Jenner, Murchison, Howard, Simon, Chadwick, Southwood Smith, Lister, Manson, and Ross are names fit company for those of Hippocrates, Galen, Plato, Malpighi, Da Vinci, Pasteur, Koch, Semmelweis, Laennec, Metchnikoff, and Ehrlich.

The story naturally resolves itself into a history of the discovery of the causation and means of spread of the main diseases and pestilences, cholera, small-pox, plague, and malaria, and of the means of combating these. The road through ignorance, superstition, prejudice, conceit and arrogance and indifference is a rough one and not always has it been the path to glory for the traveller. A realisation of the possibilities of human life along with hard work and applied knowledge, conviction and personal practice are the weapons of emancipation to the individual and to the masses. The process goes on, now faster, now slower, but always; and the perusal of this volume will instruct and encourage all those who have to preach and practice the ways and means of health.

A. D. S.

HEALTH SUPERVISION AND MEDICAL INSPECTION OF SCHOOLS.—By Thomas D. Wood, A.M., M.D. and Hugh Grant Rowell, A.B., M.D. London and Philadelphia: W. B. Saunders Co., Ltd., 1927. Illustrated. Pp. 637. Price, 35s. net.

THIS is a very complete and detailed account of the activities of the methods of health supervision and medical inspection of school children as carried out in the United States of America. The method of arrangement, however, makes it a difficult book to read. All the

information given is catalogued and classified by numbers, a system which kills any literary style, and makes reading the book a somewhat tiresome task. Each chapter is replete with specimen forms, records, scoring cards, tests, tables, reports, instructions, regulations, etc.; and while these are undoubtedly illustrative, they convert the book into a reference manual, and are apt to detract attention from the text, much of which is of great interest. The "scoring card" system is much in vogue in America now, and is used to assess mental intelligence, health, dairies, school construction, desks, etc. These are no doubt valuable, but too much cataloguing is apt to rob any study of its interest, and we sympathise with Keats for whom the rainbow was ruined by being put into the "dull catalogue of common things."

There is a wealth of information in the book, but not much of real practical application to Indian conditions.

A. D. S.

ELEMENTARY SANITARY ENGINEERING IN INDIA.

—By G. Bransby Williams. Third Edition. Revised and Enlarged. Calcutta: Thacker, Spink and Co., 1928. Pp. viii plus 133. Price, Rs. 6.

THE Inspector of Nuisances, or the Sanitary Inspector as he is now more euphemistically called, has played a very important part in the development of environmental sanitary science. He was and still is, the immediate instrument of the local authority both for detecting and remedying defects in the sanitary conditions of the village, the township and the municipality. To the Sanitary Inspector an elementary knowledge of sanitary engineering is essential. In England such instruction is given at the Royal Sanitary Institute. In Bombay courses of instruction are given under the auspices of the Institute. In Bengal the Public Health Department arranges for courses of teaching for sanitary inspectors, who at the end of their training in hygiene and sanitary engineering undergo examinations. Mr. Bransby Williams' manual is meant for these classes, and provides the theoretical and descriptive parts to supplement the practical and outdoor instruction. The chapters are well arranged and cover a large amount of ground, map reading, drawing, surveying, building construction, drainage, sewage and waterworks are all dealt with in concise and clear language.

There are about 30 plates of diagrams which illustrate the text matter very well. Health officers, Directors of Public Health, and students wishing for a clear description of the elements of sanitary engineering will find the book valuable. The matter is treated in an essentially practical manner and the author draws on his large experience to give authoritative descriptions and opinions.

The printing and the plates are excellent.

A. D. S.

MOSQUITO SURVEYS: A HANDBOOK FOR ANTIMALARIAL AND ANTI-MOSQUITO FIELD WORKERS.—By Malcolm E. MacGregor. London: Baillière, Tindall and Cox, 1927. Pp. 282, with 3 maps and 59 other illustrations. Price, 15s. net.

THIS work can be thoroughly recommended to the medical man without special entomological training, or even as a refresher to those whose taking of the D.T.M. is a long-past event, and to engineers and planters who wish to acquire the foundations of anti-mosquito entomology, but except in Part III it contains nothing that the professional malariologist would not consider the basic part of his entomological training.

Unless the author is assured of a heavy sale in the Mascarene Islands, we think the book would be more likely to "go" in the tropics in general if Mauritius was relegated more to the background. In any case this impression would be less marked if a general account of these islands did not open the book, or if this had been transferred to Part II, which is apparently written specially for Mauritian workers.

Part III, field and laboratory hints, we have nothing but praise for. There is no worker, however, long his

experience, who will not profit by a study of pages 184 onwards; hence the book must be added to the library of every medical entomologist.

It is easy to criticize minor points, but we would point out that the Nematocera are not all small, some of the Tipulids are among the largest of living diptera. Personally we have never heard of the four apical joints of the tarsus being described as "metatarsals," and it is better in any case to drop the use of this term even for the basal joint of the tarsus, as it has no homology with the vertebrate joints of the same name. In Fig. 11 the part that the author has, correctly, referred to as the post-scutellum is here called the metanotum, and the fact that the latter name is a survival from an older nomenclature is not pointed out.

For a simple account of the male genitalia such as is required for systematic purposes, we prefer Christophers' and Barraud's to that of Edwards, (*Ind. Jl. Med. Res.*, X, 827-835). On page 75 the homology of the mouth brushes of the larva is, as usual, left unexplained, whilst the statement on page 79 that palmate hairs are found on segments 3-5 of most Anopheline larvæ is misleading, as those who work with the book as their first introduction to the subject will seldom have any difficulty in discovering these on other segments also.

The account of the Mauritian mosquito fauna, which forms Part II of the book, will be invaluable to all workers in the Mascarene Islands, but the writer is fortunate in having to deal with a local fauna of such paucity that a complete account of its various species can be included in so small a book. Within the tropics, there is hardly anywhere else where this could have been done.

R. S.-W.

A SHORT ILLUSTRATED GUIDE TO THE ANOPHELINES OF TROPICAL AND SOUTH AFRICA.—By Alwen M. Evans, M.Sc. London: Messrs. Hodder and Stoughton, Ltd., 1927. Pp. 64 with 10 text figures and 12 plates. Price, 9s. 6d. net.

ANOTHER work identifying the Liverpool School with the development of the New Dominion. Keys to African Anophelines have previously appeared from the pens of Edwards (1912), and Carter (1919), while Christophers (1924) has included them in his more general catalogue of the Anophelini of the world.

The author's key however brings the subject right up to date, after consultation with all the latest work on the subject, of which a good bibliography is appended. An early Victorian dichotomous "key" was merely a weariness to the flesh and despair to a student, but in these enlightened days such works are heavily illustrated, altogether a different matter; and one day indeed some Bolshevik will publish a key with no text at all and only draw groups of visual pegs on which to hang up the required names. In this case the author's drawings are a delight, and have been produced in a most enviable manner, as indeed has the whole work.

Beside the key there is a short description of other salient factors in the life of each species, including notes illustrated by plates on their breeding places, all of which information should greatly help the local officers concerned in their efforts to lay the malarial ghost.

There is no doubt but that local keys of the Anophelines are the first requirement in any malarious locality, and the present work amply meets this want as far as the adults of the species are concerned.

C. S.

STANDARD METHODS OF THE DIVISION OF LABORATORIES AND RESEARCH OF THE NEW YORK STATE DEPARTMENT OF HEALTH.—By A. B. Wadsworth, M.D. London: Baillière, Tindall and Cox, 1927. Pp. xx plus 704, with 12 plates and 70 figures in the text. Price, 34s. net.

THE Director of the Division of Laboratories and Research of the New York State Department of Health

had been in the habit of issuing to his various laboratories and departments detailed instructions with regard to laboratory methods and procedure. These instructions were not an unalterable dogma, but were continually being revised when the advance of scientific knowledge necessitated a change, or when better methods of achieving the same end were devised. These directions, usually drawn up by the heads of the several departments concerned and constantly improved throughout more than a decade by contributions from the staff, have been collected and published in the form of the volume under review.

The book is essentially a practical one but its scope is very wide. After giving a short review of general laboratory methods, including the housing and methods of using laboratory animals, detailed instructions with regard to the cleaning and sterilization of glass-ware and the preparation of media are given. This is followed by a section on the methods used in diagnostic laboratories; here directions are given for the opening, labelling and filing of specimens. Detailed instructions are given for the routine examination of various pathological specimens and methods for identification and isolation of various pathogenic organisms. There is a section on the methods employed for the examination of water, milk, sewage and so forth. One of the largest sections in the book is devoted to the details of preparation of vaccines and antisera. Finally there are two sections on the methods employed in the executive offices and in the research, publications and library departments. There is much in this volume which is not applicable to Indian conditions, but officers in charge of any bacteriological, vaccine or serum manufacturing, or Public Health laboratories will certainly find many valuable suggestions, both for general procedure and for technique, in these pages.

The reviewer found it hard to follow the plan of arrangement of the section on methods employed in the diagnostic laboratories. In one or two instances certain well-known methods which are distinctly better than those described appear to have been overlooked; for example in describing the withdrawing of blood from the ear of a rabbit no mention is made of the well-known device of dipping the ear into melted paraffin so that the walls of the vein do not collapse and stop the flow of blood. The bibliography is meagre and the titles of the papers are omitted; this is, we think, a mistake. The book on the whole is, however, an excellent one, the illustrations are useful, and the text clear and readable.

L. E. N.

LOCAL IMMUNIZATION: SPECIFIC DRESSINGS.—
By A. Besredka. Translated by H. Plotz, M.D.
London: Baillière, Tindall and Cox, 1927. Pp. xl plus 187. Price, 16s. net.

THIS is the English—or perhaps one should say American—translation of Besredka's well-known book. It is an extremely readable book. It is not crowded with monotonous details of experiments, but a few experiments are quoted to demonstrate each point which the author wishes to make. To explain his theory he has taken four type bacteria, or groups of bacteria, two of which infect the skin and two the intestinal mucosa.

The book should certainly be read by anyone who wishes to understand thoroughly Besredka's theory—a theory which is not likely to be accepted as a whole, but which will certainly leave its mark on the science of bacteriology. The theory is dependent on the observation of the specific susceptibility of certain groups of cells to certain organisms. The anthrax bacillus when introduced into the subcutaneous tissues does not produce anthrax, but when it is rubbed into the scarified skin or injected into the layers of the skin anthrax follows. Again, when a living culture of dysentery bacilli is injected into the blood stream the animal does not get a septicæmia, but the bacteria rapidly disappear from the blood and on the death of the animal can only be found in the mucous membrane and in the lumen of the intestine and gall-bladder. In the same way immunity is specific to a certain degree. Immunity to intraperitoneal

inoculation may be produced in an animal which will leave it susceptible to a skin infection by the same organism, and *vice versa* skin immunity can be produced without the corresponding intraperitoneal immunity.

The last chapter in the book is devoted to theoretical considerations, or, to use one of the author's quotations from Pasteur, to "the illusions of the experimenter, which serve as a guide, and which gradually fade as we travel along the road." The author claims to have presented in his theory of local immunity the truth as it appears to-day. The reviewer finds himself almost entirely convinced by the author's arguments and even the most sceptical will admit that it is a theory which cannot lightly be brushed aside. The author himself does not claim that his theory will stand for ever; theories disappear, but the facts remain.

L. E. N.

TEXTBOOK OF BACTERIOLOGY.—By William W. Ford, M.D. London and Philadelphia: W. B. Saunders Co., Ltd., 1927. Pp. 1069. Illustrated. Price, 37s. 6d. net.

THIS is still another textbook of bacteriology, and as it has to enter into competition with many excellent rivals there ought to be some good excuse for its appearance. The special feature of this book is that the selection of micro-organisms for description is based chiefly on the personal observation of the author. It is impossible to write a complete "system of bacteriology" and the author has wisely refrained from making the attempt; he may fairly claim to have given a sufficient account of all the bacteria which are concerned in causing human disease. Special attention has been paid to the spirochætes and filtrable viruses. Protozoa are not dealt with. Methods of laboratory technique are given in some detail but a knowledge of the manipulation of the microscope is assumed to exist.

Many methods of staining, culture, etc., are described and to each is appended a reference to the original account of the method as given by its originator. The illustrations are good, all are drawn approximately to the same scale and every effort has been made to show the forms which are truly typical.

The plague bacillus is described as having been discovered almost simultaneously by Kitasato and Yersin: in an advanced textbook like this it would be only fair to give in a few words the original descriptions by the two men who first discovered the bacilli; these leave little room for doubt that the bacillus described by Kitasato was not the real plague bacillus at all.

The accounts of the bacteria which are selected for description are very full, accurate and clear. The Wassermann reaction is very briefly referred to; the Widal reaction is hardly mentioned; vaccine preparation is dealt with in two pages in a general way, and evidently such "side lines" are not regarded as coming within the scope of the book.

The organism of undulant fever is called *Bacterium melitense*, and perhaps the author might have dealt a little more fully with the question of its relationship with the *Bacterium abortus*. In the case of both these organisms the author without explanation or apology describes them as the *Bacillus melitense* and *Bacillus abortus* in the detailed account.

The classification of the spirochætes can hardly be regarded as settled: the author has adopted the rather confusing method of giving separate accounts of all the spirochetes without attempting to discuss their relationships; perhaps he has been wise in doing so, though the student will be left with an impression of vagueness and confusion similar to that which is produced by reading some modern descriptions of the fungi which occur in skin diseases.

Noguchi's views regarding *Leptospira icteroides* are given without any reference being made to the doubts which exist in the minds of many experts as to its causal relationship with yellow fever. Still another spelling is adopted for the sandfly which carries sandfly fever, viz., *Phlebotomus papatassii*.

This book forms a most valuable guide to the advanced worker; it will take its place in every bacteriological laboratory, but it is in no sense a students' textbook.

BACTERIAL VACCINES AND THEIR POSITION IN THERAPEUTICS.—By Leonard S. Dudgeon, C.M.G., C.B.E., F.R.C.S. Bombay: Oxford University Press, and London: Constable and Co., 1927. Pp. 87. Price, 7s. 6d. net.

THIS forms an excellent summary of existing knowledge of the use of vaccines in the prevention and treatment of disease. Its most valuable feature is that there is no exaggeration in the claims made for the various systems of vaccine treatment. It is impossible to lay down dogmatic rules in connection with such controversial points as the value of prophylactic vaccination against influenza and colds, but the reader will find Dudgeon's work a sane and reliable guide.

H. W. A.

SEGREGATION AND AUTOGAMY IN BACTERIA.—By F. H. Stewart, M.A., D.Sc., M.D. London: Adlard & Son, Ltd., 1927. Pp. 104. Price, 7s. 6d. net.

THIS book, which is very highly technical, describes the author's view on the segregation and autogamy in bacteria. It deals largely with the mutation changes in the *Bacillus coli communis* and the *Bacillus dysenteriae* (Flexner), and the typhoid bacillus. The author however neglects the work of d'Herelle and others showing how these mutation changes may be brought about as the result of bacteriophage action. These mutation forms are then resistant to the action of the bacteriophage.

The author is difficult to follow in his summary and in the deductions he has drawn as the result of these experiments. There is a good deal of indiscriminate reasoning by analogy from the protozoa to bacteria, which is always a dangerous method to adopt in substantiating a theory.

H. W. A.

INTRODUCTION TO THE STUDY OF THE ANATOMY AND PHYSIOLOGY OF THE EYE.—By Dr. Max Coque, B.Sc. London: J. and R. Fleming, Ltd., 1927. Pp. 458.

THIS is an unusual book, published for the instruction of prescribing opticians, and very ambitious in its scope, as it attempts in a short scope to deal with the general principles of physiology and pathology in the human body, and especially the physiology of the eye, as well as the detailed anatomy of the eye and orbit, and the usual methods of examination of the eye, both healthy and pathological, all in the short space of 445 pages. Needless to say it is very compressed and uneven, giving curious details in some points not usually in books, especially in connection with comparative anatomy and physiology, and in others it is very brief, and only to be followed by one having already a fair general knowledge of biology. The best part of this publication is the excellent series of stereoscopic photos provided with a simple form of stereoscope, which give a really good idea of the general bony anatomy of the orbit, and the macroscopic anatomy of the dissected eye. This is really good and useful, whereas one fears the text of the book, while possibly useful for those for whom it has been written, will be found of little use to medical men who have access to the many good textbooks on the eye.

RECENT ADVANCES IN OPHTHALMOLOGY.—By W. Steward Duke Elder, D.Sc., Ph.D., M.D., Ch.B., F.R.C.S. London: J. and A. Churchill, 1927. Pp. 343, with 4 coloured plates and 73 text figures. Price, 12s. 6d. net.

THIS book, the last issue of this good series, is well up to the standards of the previous volumes, and is a really valuable resumé, well put together and balanced. It starts with a discussion on the nature of light and

its influence on the eye; accommodation, according to modern views, and the causes of haloes; and deals mainly with the more scientific aspects of these problems in a very good clear way. It then deals briefly with the recent work in embryology and the recent methods of diagnosis, slit-lamp, red-free light and anterior gonioscopy. This part is short but good and very well illustrated with coloured plates. The physiology of the eye is then dealt with, the intra-ocular circulation, intra-ocular pressure, and the nature of the fluids of the eye, especially from the bio-chemical point of view, and this forms a preparation to the consideration of the diseases of the eye, high blood pressure and its results, retinal hæmorrhages, and glaucoma. This last is treated in considerable detail and the recent theory associating this disease in part at least with changes in the hydrogen-ion content of the blood is well put forward.

Cataract is described in the light of slit-lamp researches, its pathology discussed and the effects of light on the lens nutrition pointed out, and recent views on sympathetic ophthalmitis described, though the recent note of Jackson in the *American Journal of Ophthalmology* as to the comparative rarity in the diagnosis of this condition since Wassermann reaction blood tests became common is not mentioned. Photo-therapy, its use and abuse, and the newer methods of local anaesthesia are briefly described, and the book concludes with a very good and fairly detailed description of the recent neurology of the eye.

The stimulating and interesting character of the book as a supplement to the usual large textbooks will be obvious from this short resumé, and one can strongly recommend all those interested in eye work to get it and read it carefully, though in places they will probably find it fairly stiff reading.

OPHTHALMIC YEAR BOOK, VOL. XXIII. CONTAINING BIBLIOGRAPHIES, DIGESTS AND INDEXES OF THE LITERATURE OF OPHTHALMOLOGY FOR THE YEAR, 1926.—Edited by William H. Crisp. Chicago: Ophthalmic Publishing Co., 1927. Pp. 338.

THIS book continues to serve as a valuable reference record of the ophthalmic literature of the past year, and the present volume is well up to the standard of its predecessors. It is unfortunately, however, the last of its series, as difficulties in its production and want of support have made it impossible for the publishers to continue to produce it in this form, as a Supplement to the *American Journal of Ophthalmology*. It is hoped, however, that the series may be carried on in another form, and a hint as to the possibility of this appears in the *American Journal of Ophthalmology*, and one can only hope that these efforts will be successful.

THE BLOOD VESSELS OF THE HUMAN SKIN AND THEIR RESPONSES.—By Thomas Lewis, M.D., F.R.S. London: Shaw & Sons, 1927. Pp. 322. Illustrated. Price, 37s. 6d. net.

WE must congratulate the author of this excellent work on the physiology of the blood vessels of the skin. The book has been well got up and the illustrations have been very finely reproduced by the publishers. The work opens up a new line of thought about the nature of the reaction of the finest and larger vessels of the skin to different stimuli. Every worker in dermatology should possess this work, which gives a clear description of how to investigate the mechanism of arteriole and capillary action. We consider that Krog's work on the pressor substances in the posterior lobe of the pituitary gland in maintaining tone as regards permeability should also have been considered by the author. Sir Thomas Lewis has particularly studied the action of various kinds of stimuli on the different vessels of the skin, or clearly demonstrates that the finest vessels are not under a nervous control. He considers that when the skin is stroked by a hard object, the red line is due to the mechanical stimulus, whilst the flare and

wheal are due to the liberation of a theoretical H. substance, which acts like histamine on the vessels of the skin.

According to this theory, the tissues of different individuals would vary in the amount of damage caused to them by these mechanical stimuli. Thus when the damage was greatest we would get a marked red flare followed by a large wheal. We know that in persons who are susceptible to toxic bodies from foods, etc., this susceptibility is largely due to loss of control of these fine vessels. The tone is maintained by various means, the amount of pressor substances circulating in the blood from the posterior lobe of the pituitary gland, the calcium content of the blood, and the amount of adrenalin circulating in these vessels. When one or other of these factors are deficient in the blood, the poisons can act on the vessels and give rise to urticaria, etc. The production of bullæ is due to increased permeability of the capillary loops under the basement membrane, so that serum flows into the intercellular channels, whilst in urticaria the permeability affects the finer vessels in the region of the subpapillary plexus, giving rise to œdema in the corium. When both types of vessels are involved, bullous urticaria is seen in the skin. Therefore in epidermolysis bullosa the mechanical injury causes dilatation of the capillary tufts, and the formation of bullæ, whilst in dermatographia, the same type of stimulus causes the flare and wheal.

H. W. A.

DISEASES OF THE SKIN.—By Robert W. Mackenna, M.A., M.D., B.Ch. Second Edition. London: Baillière, Tindall and Cox, 1927. Pp. 450, with 36 coloured plates and 143 illustrations in the text. Price, 25s.

THE second edition of this book has been revised thoroughly, and considerably enlarged. There are 36 excellent coloured plates illustrating various skin diseases. We can strongly recommend this book to those medical practitioners who require a medium sized book on dermatology. The teaching is given very clearly and lucidly. There are many views that are expressed in this book that we do not agree with, but they are however the accepted and orthodox teaching in dermatology. As the author states, the science of dermatology is passing through a phase of extraordinary rapid growth and development, and the reader will find in this work a well balanced and up to date presentation of the subject.

H. W. A.

THE COMMON DISEASES OF THE SKIN.—By R. Cranston Low, M.D., F.R.C.P. Edinburgh: Oliver & Boyd, 1927. Pp. 223, with 68 illustrations. Price, 14s. net.

THIS small book on skin diseases gives very concisely the orthodox teaching in dermatology that is given at present to students, and can be strongly recommended as a primer for those students in England studying dermatology. The book is of little value to workers in the tropics, as the common diseases like leprosy, etc., that are met with so commonly in our dermatological clinics in India are dealt with very briefly. This, however, does not detract from the value of the book, which is one of the best of these small primers on dermatology. The main lesions that are seen on the skin in the common diseases are fully and concisely described in it. The book is well got up with 68 illustrations, 8 of which are coloured.

H. W. A.

RONTGEN RAYS IN DERMATOLOGY.—By L. Arzt, M.D., and H. Fuhs, M.D. London: Baillière, Tindall and Cox, 1927. Pp. xiv plus 202, with 5 coloured plates and 57 figures in the text. Price, 18s. net.

THE authors of this book on the value of "Röntgen rays in Dermatology," unfortunately for English readers, describe only the different kinds of German apparatus;

instead of giving the type of apparatus employed in a particular case. The section on X-ray dermatitis and the biological effects of X-rays is excellent and is illustrated by coloured plates. The chapters deal with the affections of the hair that are amenable to X-rays such as favus and ringworm; the specific granulomata, this chapter mainly comprising the effect of these rays on tuberculides and on diseases of the nails. The keratoses are then described separately, but little or no stress has been placed on the value of medicinal treatment in these cases.

There is an appendix at the end which gives the dosage employed in the various skin diseases that these authors have given to their cases. The formulæ at first sight look complicated, but one can soon read them when the nomenclature has been understood. We can thoroughly recommend this book to those workers, who are using Röntgen rays in the treatment of skin diseases.

H. W. A.

X-RAY AND RADIUM IN THE TREATMENT OF DISEASES OF THE SKIN.—By George M. Mabee, M.D. Second Edition, thoroughly Revised. London: H. Kimpton, 1927. Pp. xii plus 788, with 354 engravings and 31 charts. Price, 45s. net.

THE first edition of this work appeared in 1922 and it was very favourably received by the medical profession. This—the second edition—contains so many additions and alterations that it may be considered almost a new book—174 pages, 104 illustrations, and 300 literary references have been added. Apparatus, and technique are fully dealt with. No fewer than seven chapters are devoted to the various methods of measuring X-ray dosage. The author, in the preface to this edition, points out that X-rays and radium are dangerous modalities in unskilled hands, and every physician who employs them should have a thorough training in their use, in addition to a general medical training, and moreover should possess modern equipment. We are in full agreement with him in this respect. We also agree with Pusey's statement, repeated by the author, that "It is the consensus of opinion that X-rays constitute the most important single therapeutic agent in the armamentarium of pure dermatology. Radium, whilst being of great value to the dermatologist is of far less importance than are the Röntgen rays." Finally, we can only say that the fine reception given to the first edition is certain to be repeated in the present instance, as the book is one which should be on the bookshelf of every skin specialist, radiologist, and medical practitioner who is interested in the treatment of skin diseases.

ACTINOTHERAPY FOR GENERAL PRACTITIONERS.—By H. G. Falkner, L.R.C.S.I., L.R.C.P.I., L.M. (Rot. Dub.), O.B.E. London: Baillière, Tindall and Cox, 1927. Pp. x plus 152, with 36 figures in the text. Price, 7s. 6d. net.

THIS little volume, written principally for the general practitioner, is an intensely practical production. The author realised that the ordinary practitioner has little time for study: but while omitting all unnecessary detail, important chapters such as those on protection of glasses, elements and electrodes, and lamps, have been compiled with great care.

The chapters on the treatment of diseases are written in a racy manner, and the claims made for ultra-violet ray treatments are well balanced, e.g., in dealing with sciatia, the author says, results depend on the cause—"If due to pressure upon the nerve, no good can be expected; but if due to cold, good results nearly always follow." Such discrimination in writers on this subject is refreshing.

At the end of the book there is a short summary of diseases with their appropriate treatment which should prove more than useful to general practitioners.

Finally, we are of opinion that no medical practitioner, whether he intends to dabble in this branch of medical science or not, should be without this practical little volume.

ULTRA-VIOLET RADIATION AND ACTINOTHERAPY.—By E. H. Russell, M.D., B.S., and W. Kerr Russell, M.D., B.S. (Dub.). Second Edition. Edinburgh: E. & S. Livingstone, 1927. Pp. viii plus 439, with 247 illustrations. Price, 15s. or Rs. 11-4. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta.

THIS is the second edition of one of the best known works on actinotherapy. The first edition was well received by the medical profession and the present edition which has been enlarged and brought up-to-date should be equally well received.

The arrangement of the subject matter is excellent, the style lucid and free from verbosity. It is profusely illustrated. The chapters on technique, with the description of the various forms of arcs, lamps, and accessories are particularly good.

The chapters on treatment of various diseases are characterised by an absence of extravagant claims, such as one finds in most books on actinotherapy.

We can thoroughly recommend this little book to all who are interested in actinotherapy—to the expert for its wealth of technical detail; to the beginner for its guidance in selection of apparatus, the types of disease which react favourably, and the results which are likely to be obtained.

J. A. S.

A SYNOPSIS OF PHYSIOLOGY.—By A. Rondio Short, M.D., B.S., F.R.C.S., and C. I. Ham, M.D., B.Ch., M.R.C.S., L.R.C.P. Bristol: John Wright and Sons, Ltd., 1927. Pp. 258. Illustrated. Price, 10s. 6d. net.

THIS volume adds another number to the series of synopses on medical subjects issued by the same publishers. The object of the book is stated as being to give a fairly full summary of modern physiology in a small compass. That the authors have succeeded in their main object cannot be doubted. It is unquestionably the most comprehensive synopsis of human physiology which it has been our good fortune to meet. We have made a critical search for something to find fault with, and with the exception of one or two misprints, have discovered nothing to criticize. The treatment of most of the subjects is necessarily dogmatic and restricted, but no important points are left unmentioned and every paragraph is up to date.

We cannot help thinking that this book is a dangerous weapon to place in the hands of the average student, however, more especially in India. Physiology is a subject which should not be learned by rote. It is a subject that, forming the foundations of medicine and surgery, should be studied widely from different angles, and this book, which professedly contains all the information on the subject necessary to pass even advanced examinations, will tend to foster the habit already ingrained in the Indian student of committing pages of writing to memory.

Nevertheless this book will come as a boon to the advanced student studying special branches of this subject, to the practitioner, physician, or surgeon who wishes to keep abreast of the times, and as an aide-memoire to the lecturer on this fascinating subject.

For the general plan of the book, the arrangement of the subject matter, and the general up-to-dateness and of the information, we have nothing but the highest praise.

J. A. S.

PIERSOL'S NORMAL HISTOLOGY, WITH SPECIAL REFERENCE TO THE STRUCTURE OF THE HUMAN BODY.—Edited and Rewritten by W. H. F. Addison, B.A., M.D. London: J. B. Lippincott Co., 1927. Pp. 477, with 43 coloured plates and 432 text illustrations. Available from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 18-12 or 25s.

THIS is the thirteenth edition of Piersol's well-known book on normal histology. This edition has had the advantage of being thoroughly revised and partly re-written by Professor W. H. F. Addison.

The arrangement of the book is that which is usually followed in books on this subject; first the cell, as an entity, its structure, its vital phenomena, its methods of division, etc., are described; then the elementary tissues are dealt with in a general way; but the bulk of the book consists of a detailed description of the various organs and tissues of the body arranged according to the systems, i.e., blood-vascular system, lymphatic system, etc., to which they belong.

The part of the book relating to protoplasm, cell structure and cell division has been entirely re-written, and considerable additions, including new illustrations and figures, have been made to the sections on the bone-marrow and on blood development. The endocrine glands have been grouped together in conformity with present usage.

Reference is made to the newer methods of study of the living cell, such as microdissection, tissue culture and supravital staining, and descriptions of these are given in the appendix.

A list of selected references is given at the end of the book to pieces of original work which are suitable for the student to read. The author suggests that as part of the routine class work each student should read one or more of these papers and report on them. This seems to be an excellent suggestion, as not only does it teach the student his histology, but it may have the effect of impressing him with the fact that our present knowledge of histology is dependent on the original investigation of the past, and instilling in him a desire to undertake original investigation himself. It is somewhat unfortunate that many of the references are to journals which are not frequently seen in this country.

The format of the book is excellent; the quality of the paper is good; the print is clear; and the text is profusely illustrated, colour being introduced wherever advantage was to be gained by its use.

L. E. N.

A MANUAL OF CHEMISTRY.—By W. Simon, Ph.D., M.D., and Daniel Base, Ph.D. Thirteenth Edition. London: Baillière, Tindall and Cox, 1927. Pp. xvi plus 695, with 6 coloured plates and 55 figures in the text. Price, 25s. net.

THE book is primarily meant for students of medicine and pharmacy. It deals with both inorganic and organic chemistry. The opening section on the fundamental concepts of matter and energy gives a general idea of some of the common scientific terms usually described in physics. In the section on inorganic chemistry, the summary of the analytical characters of the elements and the coloured plates given at the end of the various groups, which form a special feature of this book, are very useful additions for helping students. A special section on analytical chemistry, with practical hints and tables, adds to utility of the book. The author has touched upon practically the whole field of organic chemistry, laying special emphasis on the compounds used in medicine, although one notices a less thorough treatment of this section as compared to the excellent treatment of the inorganic section.

On the whole, the book contains in one neat volume a collection of almost all the useful information required by a student either for medicine or for pharmacy, and it should prove a very good book of reference for them even in their future career.

S. G.

A MANUAL OF PHARMACOLOGY AND ITS APPLICATIONS TO THERAPEUTICS AND TOXICOLOGY.—By Torald Sollman. Third Edition. London and Philadelphia: W. B. Saunders Company, 1927. Pp. 1184. Price, 36s. net.

THE author in the preface says that the dominant object of this manual is to furnish the medical student and the practitioner with an outline of the current conceptions of the actions of drugs, especially from the point of view of their practical importance in medicine. No other book on this subject in the English language succeeds better in this object than the

book under review. Pharmacology is a rapidly growing branch of medicine and much work is being done and many new drugs are being constantly introduced. The third edition of this valuable book is, therefore, very welcome. This present volume has been entirely reset and much new matter has been included and the bibliography has been considerably enlarged. The arrangement of the book is such that it can be used both as a textbook by junior students and as a book of reference by advanced students and practitioners. This book should be in the possession of all those who wish to practice rational medicine.

R. N. C.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY AND THERAPEUTICS.—By Sir William Hale-White, K.B.E., M.D. (Lond.), M.D. (Dub.), LL.D. (Edin.). Nineteenth Edition. London: J. A. Churchill, 1927. Pp. viii plus 712. Price, 10s. 6d. net.

THE nineteenth edition of this popular handbook on materia medica has been revised and the subject matter has been brought up-to-date. The description of many new drugs which have been recently introduced into therapeutics is included in the text. The book forms a very useful and handy volume for students and practitioners alike.

R. N. C.

MATERIA MEDICA FOR NURSES.—By A. Mulr Crawford, M.D., F.R.S.P.S.G. London: H. K. Lewis and Co., Ltd., 1927. Pp. viii plus 86. Price, 3s. 6d. net.

THIS small book has been written with the object of presenting a short summary of the elements of materia medica to the members of the nursing profession. The drugs commonly used, their preparations and dosage, and short notes on their pharmacological action and toxic effects have been concisely given. The general arrangement of the book is good and the classification of drugs adopted is simple and readily understandable. We have no doubt that the book will be useful to the nursing profession.

MUTER'S SHORT MANUAL OF ANALYTICAL CHEMISTRY.—Edited by J. Thomas, B.Sc. (Lond.). Eleventh Edition. London: Baillière, Tindall and Cox, 1927. Pp. xiv plus 238, with 86 figures in the text. Price, 8s. 6d. net.

THIS is a concise but thorough manual for students of analytical chemistry. It deals with practically all the subjects, both inorganic and organic, which are required for medical and pharmaceutical students. Both the qualitative and quantitative sides have been well developed, and make it a very useful and an extremely handy volume, not only for students but also for all the other workers engaged in analytical work.

S. G.

STUDIES IN PSYCHOLOGY.—By William Elder, M.D., F.R.C.P.E., F.R.S.E. London: William Heinemann Medical Books, Ltd., 1927. Pp. xv plus 212. Price, 8s. 6d. net.

THIS book expresses another attempt to approach psychology in terms of neurology. The procedure is by no means new, and in this particular instance is fuller than usual of the fallacies which are inevitable to such a method of approach. The author deals with such subjects as memory, emotion, consciousness, sleep, dreams, and what he terms, "allied mental phenomena." Under this heading he includes among other matters hypnotism and somnambulism. A considerable portion of the book is devoted to what is presumably intended to be a refutation of psychoanalytical psychology. The author trots out most of the old, and now somewhat threadbare, objections to the teaching of Freud in such a manner as to make it fairly obvious that he has not taken sufficient pains to understand the fundamentals of Freud's psychology. For instance, the author conceives Freud's conception of the "censor" to be something in the nature of an alter-ego. He writes: "If

the censor is an entity apart from the ego, it necessarily follows that it practically means a return to the old belief in demoniacal possession." Freud's own description of the censor is to the effect that it was a function of consciousness. Freud compares consciousness with a sense organ in that it is concerned with the perception and differentiation of psychical qualities. Its action differs from that of a sense organ in so far that it allows the perception not only of externally produced stimuli, but also of internal psychic processes. Then on p. 199 we read: "Dream interpretation associated with psycho-analysis becomes, then a 'placebo.'" The way in which the author labours to convey to his reader the impression that the whole of Freud's teaching is a mere farrago of nonsense would be only amusing were it not for the fact that Dr. Elder is a Fellow of the Royal Society and of the Royal College of Physicians of Edinburgh. From a member of such learned societies, work of this description cannot ever be amusing. On the other hand, it can be pathetic, which, in this instance, it most assuredly is.

O. B. H.

MENTAL HANDICAPS IN GOLF.—By Theo B. Hyslop, M.D., F.R.S.E. London: Baillière, Tindall and Cox, 1927. Pp. xv plus 112. Price, 3s. 6d. net.

THIS is a very readable little volume, although somewhat long-winded. In fact it is a pity that the author has not taken some of his own advice to heart, and not wasted so much time in addressing the ball. Most of what he says in 100 pages might be condensed into 25, and then the book would be scarcely worth while. The reviewer is informed by a scratch golfer that the proper mental stance is largely a question of practice. The author does not stress this sufficiently. There are recipes for improving one's mental stance which the author entirely ignores. He merely makes the diagnosis but says nothing about treatment. For instance, one of John Ball's tips is never to worry where your opponent's shots go, and one of the best ways to ensure this particular mental stance is deliberately to turn your back on your opponent when he is playing. No doubt this little volume will be widely read, but whether the results will be that the reader's "mental armour may be wrought in metal without alloy" as the author hopes, is another question.

J. A. S.

OPERATIVE DENTISTRY.—By J. D. Hamilton Jamieson, H.D.D., L.D.S. (Edin.). Edinburgh: E. & S. Livingstone, 1927. Pp. 216. Price, 7s. 6d. net. Obtainable from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 5-10.

THIS is volume IX of the *Outlines of Dental Science Series*, published by E. & S. Livingstone, 16-17, Teviot Place, Edinburgh, pp. 215, with 27 illustrations. 1927. Price 7 shillings.

THIS book aims primarily at putting before the dental examiners of the United Kingdom, the salient points in operative dentistry. There are thirteen chapters devoted to operative dentistry, in all 196 pages. It is evident that the subject matter has been dealt with all too succinctly; in fact the descriptions given of some of the operative procedures are rather brief and would not be very well understood by beginners. A very obvious chapter, namely, one of the anatomy of the teeth has been omitted, to the great detriment of the usefulness of the book. We fail to see how chapter XIV on impression-taking, choice of teeth and crowns comes under the heading of operative dentistry.

The book may be used as a reference book for dental practitioners and students, but it is not meant to take the place of the standard textbooks on the subject. Taking only one example, in chapter VI on hyper-sensitive dentin, no mention is made of one of the most excellent ways of relieving hyper-sensitive dentin, namely by the use of the *gazotherme*. Even if the invention and apparatus be French, science is international and the world would think very poorly of

a dentist who does not know or has not read about a most important instrument for the alleviation of pain, while preparing cavities. Omissions of this nature are many, and are probably due to the fact that the book has been made intentionally short and compact.

The printing and get-up of the book are excellent and are in keeping with the reputation of its well-known publishers.

R. A.

AIDS TO GYNÆCOLOGY.—By R. E. Tottenham, B.A., M.D., D.P.H. (Dub.), F.R.C.P.I. Seventh Edition. London: Baillière, Tindall and Cox, 1927. Pp. viii plus 132, with 25 figures in the text. Price, 3s. net.

This is an excellent little "cream" students' book, with all the important points mentioned, and it should prove useful to those for whom it is intended, provided that they have attended the bedside and theatre clinical lectures. The only merit of such publications is that they are *multum in parvo* compendiums of information, but unintelligible unless the student has seen for himself the conditions and operations so summarily outlined clinically, and can therefore visualise them.

There is a misnomer on p. 41, where for "Wertheim" "Watkins" should be read instead.

Annual Reports.

ANNUAL ADMINISTRATION REPORT OF THE ASANSOL MINES BOARD OF HEALTH FOR THE YEAR, 1926-27. BY J. W. TOMB, CHIEF SANITARY OFFICER, ASANSOL MINES BOARD OF HEALTH.

As most of our readers must now be aware, the Asansol Mines Board of Health is an *ad hoc* sanitary authority charged by law with the prevention and suppression of infectious disease in the coal mining area of Asansol, and with the improvement of general sanitary conditions throughout the area. To these ends it has special powers granted by law, special funds, and a special sanitary staff. Dr. J. N. Tomb is the Chief Medical Officer of the Board. Dr. Tomb's organisation is well known, a trained sanitary inspector working in a "circle" which he can easily visit and control, in close touch with villages and collieries on one hand, and by bicycle and telephone and train with headquarters, is the mainstay of the system. Information regarding infectious disease is quickly obtained, and speedy action immediately possible. The income of the board is obtained from a special cess on the output of coal and from royalty receivers. The report does not state the area of the settlement. The population is about 400,000 and the income is roughly Rs. 1,30,000 and the expenditure Rs. 1,20,000.

The birth-rate for the year was 26.16, and the death-rate 18.48 per mille (not we presume per cent. as the report states). There is thus a very considerable excess of births over deaths, which has been a noticeable feature since 1921. There were 815 cases of cholera with 462 deaths (1.4 per 1,000), most of which occurred in the villages. The spread of the disease was prevented by the various routine measures of the Board's staff. There is no mention however of anticholera inoculation. The research work carried on by Dr. Tomb and Dr. Maitra on the non-agglutinating vibrio found during the cholera season in the population of endemic areas and in unreserved tanks is of very great interest and importance. Small-pox threatened to assume serious proportions but wholesale vaccination and revaccination succeeded in keeping the disease within limits.

Respiratory diseases and "fevers" caused most of the mortality, though malaria was much below the usual. The infantile mortality ratio was 138, a figure which compares very favourably with any place in India.

A feature of the Board's work is the provision of trained midwives and attendance on the women of the settlement during their confinements, while the regular inspection of school children is carried out by a special officer.

Twenty-eight new wells were constructed during the year.

The report is short but to the point, and illustrates the sanitary progress that can be surely made by a well conceived and well directed active organisation directed against infectious disease.

The Board of Health and Dr. Tomb and his staff are again to be congratulated on an excellent year of work and progress.

A. D. S.

PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOR. ANNUAL REPORT FOR THE YEAR 1926-27. BY LIEUT.-COL. T. H. GLOSTER, M.B., D.P.H., I.M.S., DIRECTOR. MADRAS, SUPERINTENDENT, GOVERNMENT PRINTING.

The Pasteur Institute at Coonoor again showed a decline in the number of patients treated—415 in this year as against 572 in the previous year—as the result of the policy of widespread distribution of antirabic vaccine to district and headquarter hospitals in the Province. No less than 4,373 persons, however, were treated with vaccine manufactured at the Institute, as against a corresponding figure of 4,044 for the previous year: and these figures show a steady and normal increase. As in former years, the total hydrophobia and failure rates are slightly higher for patients treated with vaccine issued to outside centres than for patients treated at Coonoor; the figures are respectively for total hydrophobia rates 0.66 and 0.83, per cent., and for failure rates 0.57 and 0.43 respectively, but the disparity in the numbers concerned in the two groups is sufficient to throw doubt on the reliability of these results as a test of the value of treatment under the two different sets of conditions. (If anything, the conditions present should militate against the Coonoor figures, for—with vaccine generally available throughout the Province—it is the more severely bitten or late cases that will especially tend to go to Coonoor itself for treatment.) Returns from the different districts are on the whole satisfactory, but Bangalore and Hyderabad are noteworthy for failure to follow up treated patients and to ascertain their after-history.

As mentioned in previous reports, an analysis of the general figures with regard to the prevalence of rabies in the Madras Presidency goes to show that not more than one-sixth of the persons bitten by certainly rabid animals now receive treatment, and the future scope for antirabic work in India is almost unlimited. During the year the outside issue of antirabic vaccine was extended to mission hospitals in the Province. Expenditure on general propaganda work was also sanctioned by the General Committee during the year.

The statistical tables with which the report is illustrated chiefly concern only those patients treated at Coonoor, as it has proved difficult or impossible to obtain exact statistical information with regard to those treated elsewhere. Earliness of arrival is very marked in these tables, and only 35 out of the 415 patients treated arrived later than 20 days after being bitten. The distribution of cases throughout the year is singularly uniform, and there seems to be but little evidence of any rabies season in India. Jackal bite is a very unimportant element in the Coonoor figures—only 838 out of 29,957 persons bitten and treated during nineteen years having been bitten by these animals. Human bites in this table give the unexpectedly high figure of 157 cases, and 63 cases are put down to bites by equines.

The financial section of the report shows how loyally the Institute is supported by local bodies in the Madras Presidency. The total expenditure during the year

was Rs. 81,750: of this sum a very large sum—Rs. 41,305—was realised by the sale of the vaccine to outside bodies. The commercial firms in Madras subscribed Rs. 1,030; the Madras Presidency District Boards Rs. 5,301; and the Madras Presidency Municipalities Rs. 3,802. This shows how dependent the Institute is on local support.

The Coonoor Pasteur Institute at the present moment differs from certain other antirabic institutes in India in its policy of widespread issue of antirabic vaccine throughout the Madras Presidency. This issue of vaccine—it is hardly necessary to add—is most carefully controlled and supervised, and the vaccine is only issued to authorised bodies, such as district and head-quarter hospitals. Nevertheless this issue of vaccine provides an important source of income to the Institute, and is a new departure, perhaps of a somewhat experimental nature. It is difficult to judge of results, since it is so difficult to follow up patients treated in out-station headquarters. The policy, however, is a bold one, and—so far at least—justified in its results.

Correspondence.

NURSING ARRANGEMENTS IN UP-COUNTRY HOSPITALS AND INFIRMARY WARDS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The question of adequate nursing arrangements in up-country hospitals, and also in the chronic wards of the more important institutions in large centres, is one which seems to have hardly received sufficient attention. In many cases the general attitude has been to press for a regular nursing service on European lines, and in the meantime to be content with the ordinary untrained ward attendant—ward-boy or ayah—who is usually little better than a *hamal*. It seems clear that under ordinary conditions the average up-country civil hospital will never be able to afford highly trained nurses on any reasonable scale, and it is therefore worth while to consider whether some more economical substitute cannot be devised. A scheme for improving the status and efficiency of ward attendants has been under the consideration of the Bombay Government for some time past, and although, owing to financial stringency, funds have not yet been provided, I hope it may shortly come into operation. Some of your readers may possibly care to know the rough details, and I append them, in case anyone may care to give the proposals a trial elsewhere. The main factor which should make a policy of this kind practicable is the spread of primary education, which is now making large numbers of literate persons available at comparatively low rates of pay. The idea is by offering a small advance on the salaries of the present ward attendants—who are in my experience mostly entirely illiterate—to obtain men and women who can read and write in their vernaculars, and also of a somewhat superior social status to those at present employed. Immediately on entering the hospital, these people start an elementary course of training, with the aid of a simple vernacular manual which would have to be specially prepared, and suitable models and diagrams, many of which are already obtainable from the Red Cross and St. John's Ambulance Associations, a skeleton, and necessary apparatus which would already be available in the hospital. The course would include elementary practical anatomy and physiology, hygiene, and in fact most of the subjects which are taught to regular nurses, but on much simpler lines, and would be carried out under the supervision of the medical staff, and the matron or other trained nurse if available, and it would conclude with a viva voce examination on very practical lines. On passing this examination the attendants would be entitled to a small increase in pay.

Further, in order to encourage the recruitment of the right type of people, the housing question would have to be reconsidered in most of the hospitals with which I am acquainted. Instead of the miserable one-room quarter which is all that many hospitals at present boast, something on the lines of a married sepoy's quarter should be provided, with at least two fair-sized rooms, in addition to a verandah in front and a small yard with wood-shed and washing enclosure behind. With a more intelligent, respectable and literate personnel of this description, trained even on these elementary lines, and properly housed, I feel sure that the work of many of our up-country hospitals would be immensely improved, and I consider that the same principle could be applied, with economy and quite satisfactory results, to the chronic wards of infirmaries and even the larger city hospitals.

A necessary adjunct would of course be a fully trained matron, with one or more staff nurses, to exercise a suitable supervision of the inferior nursing staff.—Yours, etc.,

A. HOOTON, C.I.E.,
MAJOR-GENERAL, I.M.S.

KASAUJI,
3rd March, 1928.

FIRST-AID IN RIOTS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—As riots are unfortunately not infrequent in India nowadays, it seems to me that Government should lay down rules and regulations for the guidance of such independent medical practitioners who happen to be on the spot when a riot occurs, or who live in the close vicinity. It appears to me that the best course for the medical practitioner would be to remain in his house until the police appeared and were able to keep some sort of order. The question of payment of fees for services rendered would next have to be considered.—Yours, etc.,

D. BHARADWAJ, L.R.C.P., L.R.C.S. (Edin.),
L.R.F.P. & S. (Glas.).

GANGOHI, SAIHARANPUR,
18th October, 1927.

HYPERTONIC SALINE IN SNAKE-BITE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In your issue for October 1924, there appeared a report on a case of snake-bite due to *Echis carinatus* treated with hypertonic saline solution intravenously, by Dr. Chuhar Singh. To my mind this article affords subject for meditation, inasmuch as the case was in all probability cured by the repeated intravenous saline transfusions. The constant bleeding, together with the constant replenishment by saline solution, must have acted by washing the toxin out of the tissues, as it were. The bleeding stopped as soon as the venom was sufficiently diluted. Calcium was therefore contra-indicated, contrary to your suggestion in the footnote. The idea strikes me that it stands to reason to try to treat both colubrine and viperine snake-bite cases by a constant slow saline transfusion or repeated transfusions according to indication, while encouraging free bleeding from the site of the wound, together with stimulants to keep up the respiration and the heart. As the aim should be to dilute the toxin sufficiently and to aid its elimination, cathartics, diuretics and diaphoretics should also be of benefit if judiciously employed. Calcium in viperine poisoning will therefore only do harm, while sodium citrate in colubrine poisoning may be beneficial.

I make no mention of antivenene, as it is not generally available in the *mofussil* market, where the majority of snake-bite cases takes place. The private country-practitioner can seldom procure it at the right moment; and without it he is at a loss to find sufficient antidotes to earn the satisfaction of having done all that could be done for his patient. I am of opinion

that there are immense possibilities for the use of free saline transfusion, either by itself or even as an adjunct to antivenene treatment.

As regards the use of potassium permanganate, it can be argued that lavage with a solution sufficiently weak not to provoke sloughing should be more active than the mere packing of the wound with crystals, as a liquid would more thoroughly and more quickly get at the poison in the interstices of tissue substance.

Incisions should only be deep at the site of and just about the bite, while scarification of the whole area distal to the ligatures is also of benefit by letting out much affected blood.—Yours, etc.,

R. K. BHATTACHARYYA, M.B.

NARADWIP.

10th February, 1928.

THE PRICE OF NOVARSNOBILLON.

To the Editor, THE INDIAN MEDICAL GAZETTE.

DEAR SIR.—As we have been advised by the India Office to make known in India our new reduced prices of Novarsnobillon, we are giving below the prices to the medical profession which are now governing in that country.

Novarsnobillon.	Rs.	As.	P.
0.15 gramme	..	0	15 0
0.30 "	..	1	4 0
0.45 "	..	1	6 3
0.60 "	..	1	10 8
0.75 "	..	2	0 0
0.90 "	..	2	5 9

We are also appending the new prices of Stovarsol which will come into force in India on 1st March, 1928.

Stovarsol.

	Rs.
Bottles of 28 X 4 grain tablets	.. 3
Bottles of 14 X 4 grain tablets	.. 2

We shall be obliged therefore if you will kindly give adequate space to the notice of these alterations in your next issue.

We are, dear Sir.

Yours faithfully.

for MAY AND BAKER LIMITED.

BATTERSEA, LONDON, S. W. 11.

24th January, 1928.

A CASE FOR DIAGNOSIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—On the 27th September, 1927, I was called to attend a patient at 4-30 p. m. He was a hill boy about 19 years of age. I found him in the following condition.

He was lying on his back with both legs extended; the arms were flexed and placed crosswise on the chest and were shaking. The condition of his hands was very peculiar, they were in the so-called 'obstetric position.' Both his arms and legs were very stiff, and I could neither flex his legs nor extend his hands, although I exerted all my strength. No lock-jaw was present and he could swallow fluids. He was partly unconscious and could not speak distinctly. The temperature was 100°F. I could detect no other abnormality.

At first sight I thought the case to be one of tetanus, but the absence of lock-jaw and of any history of injury was against this. Being unable to diagnose the case I gave his parents the following prescription;

R Potass. bromidi gr. x
Chloral hydratis gr. x.
Aquam ad oz. i.

M. ft. Mist. Four such doses. To be given every two hours until he falls asleep.

Also calcium lactate in 7½ grain doses three times a day.

The next morning the parents reported to me that the boy had fallen asleep after the third dose of the mixture, and I found him much improved. The stiffness of the arms and legs had somewhat diminished. The dose of bromide and chloral was now reduced, and the mixture given three times in the day. On the third day the mixture was stopped. The calcium lactate however was continued for another 8 or 9 days, by which time the patient was completely cured.

I shall be much obliged if any of your readers can throw some light on the case.—Yours, etc.,

A. K. GHOSE, L.M.P.

AMBARI TEA ESTATE,
CARRON, P. O. JALPAIGURI.
12th February, 1928.

Note.—Surely a case of tetany? EDITOR, I. M. G.

SUGGESTED USE OF UREA-STIBAMINE IN SEPTIC CASES.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR.—In June 1927 I started the urea-stibamine test for kala-azar in this hospital and was struck by the fact that a positive test consisted in the precipitation of globulin in the blood serum tested.

I discussed this reaction with my Assistant Surgeon, Dr. Sen, and suggested that the reaction might mean that the curative effect of urea-stibamine in kala-azar was partly due to a protein reaction.

Dr. Sen on his own initiative commenced giving urea-stibamine, 0.05 grm. intravenously, to septic cases running a prolonged temperature, in July 1927.

The result was so striking in the first case that we made it a routine to give urea-stibamine to all septic cases not reacting to ordinary treatment.

The first case treated had been running a temperature outside hospital for two months, and was admitted with a bunch of caseating secondarily infected glands in the left axilla. The glands were removed but the temperature persisted in spite of polyvalent serum and intravenous injection of iodine. The blood was negative to the formalin test, but slightly positive to the urea-stibamine test. Two doses of 0.05 grm. of urea-stibamine at two days' interval brought the temperature to normal. Dr. Sen is publishing his results. It is of interest to note that in all septic cases the globulin content of the blood is increased.

I am writing this note, as Sir Leonard Rogers in the *Lancet* for January 14th, 1928, points out that tartar emetic controls prolonged febrile reactions in cases of leprosy, which are being treated with potassium iodide. Does potassium iodide increase the blood globulin and is blood globulin increased in leprosy?—Yours, etc.,

A. H. NAPIER,
LIEUT.-COL., I.M.S.,
Civil Surgeon.

MONGHYR.

13th February, 1928.

Service Notes.

THE I.M.S. DINNER CUP.

THROUGH the kindness of Col. Granger, I.M.S., one of the Secretaries to the I.M.S. Dinner in London, and of Col. Fleming, I.M.S., we are able to publish the engraving below of a silver cup which has been made for the annual I.M.S. dinner in London by Messrs. Carrington and Co., 130, Regent Street, London, who will store the cup, sending it as required to the Trocadero Restaurant for the dinner.

The cup is a copy of a Jacobean steeple cup, but instead of an ebony base has a silver pedestal on which are engraved the names of all the officers who have

presided at the annual dinner since its initiation, as also the names of all Secretaries. Those of our readers who



have attended the dinner will be interested in this new departure.

APPOINTMENTS AND TRANSFERS.

Colonel C. Hudson, C.B., C.I.E., D.S.O., F.R.C.S., I.M.S., to be Honorary Surgeon to The King, Indian Military Forces *vice* Colonel A. N. Fleming, D.S.O., M.B., I.M.S. (retired), 9th September, 1927.

Colonel R. W. Knox, D.S.O., M.B., F.R.C.S., I.M.S., to be Honorary Surgeon to The King, Indian Military Forces, *vice* Colonel E. L. Perry, D.S.O., I.M.S. (retired), 24th June, 1927.

The Viceroy and Governor-General has been pleased to make the following appointments on His Excellency's personal staff, with effect from the 28th February, 1928:—

To be Honorary Surgeon.

Lieutenant-Colonel C. A. Sprawson, C.I.E., M.D., F.R.C.P., I.M.S., *vice* Lieutenant-Colonel F. F. Elwes, C.I.E., M.D., I.M.S. (retired).

Lieutenant-Colonel F. E. Wilson, I.M.S., Residency Surgeon and Chief Medical Officer in Baluchistan, is appointed to officiate as Civil Surgeon, Quetta, in addition to his own duties, with effect from the 1st January, 1928, and until further orders.

Lieutenant-Colonel F. E. Wilson, I.M.S., an Agency Surgeon is appointed to be Residency Surgeon and Chief Medical Officer in Baluchistan, with effect from the 1st January, 1928.

Consequent on the grant of leave to Colonel J. D. Graham, C.I.E., I.M.S., Lieutenant-Colonel F. P. Mackie, O.B.E., M.D., F.R.C.P., F.R.C.S., D.P.H., I.M.S., Director, Haffkine Institute, Bombay, is appointed to officiate as Public Health Commissioner with the Government of India, with effect from the date on which he assumes charge of his duties.

Consequent on the grant of leave to Brevet-Colonel S. R. Christophers, C.I.E., I.M.S., Lieutenant-Colonel J.

Cunningham, I.M.S., Director, Pasteur Institute of India, Kasauli, is appointed to officiate as Director, Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

Lieutenant-Colonel J. W. D. Megaw, C.I.E., V.H.S., I.M.S., Director, School of Tropical Medicine and Hygiene, Calcutta, is appointed to be Inspector-General of Civil Hospitals, Punjab, with effect from the date on which he assumes charge of the duties of that post.

Lieutenant-Colonel T. C. McCombie Young, M.D., D.P.H., I.M.S., an Officer of the Medical Research Department, is placed on foreign service under the Indian Research Fund Association, with effect from the 1st March, 1928.

Major R. H. Malone, I.M.S., officiating Assistant Director, Central Research Institute, Kasauli, is appointed to officiate as Director, Pasteur Institute of India, Kasauli, *vice* Lieutenant-Colonel J. Cunningham, I.M.S.

Major W. O. Walker, M.B., F.R.C.S., I.M.S., officiating Civil Surgeon, Darjeeling, is appointed to act as Civil Surgeon, 24-Parganas, *vice* Lieutenant-Colonel A. Denham White granted leave.

Major T. L. Bomford, M.D., I.M.S., on return from leave, is appointed to act as Civil Surgeon, Darjeeling, *vice* Major Walker, transferred.

Major R. M. Kharegat, I.M.S., an officiating Agency Surgeon, is posted as Medical Officer and *ex-officio* Vice-Consul, Sistan, with effect from the 16th February, 1928.

The services of Major N. Briggs, I.M.S., are placed permanently at the disposal of the Punjab Government for employment in the Jails Department, with effect from the 24th March, 1925.

Captain K. R. K. Iyengar, I.M.S., Assistant Director, Central Research Institute, Kasauli, is attached as a Supernumerary Officer to the Pasteur Institute of Southern India, Coonoor, with effect from the date on which he assumes charge of his duties and until the 11th April, 1928, from which date his services are placed at the disposal of the Government of Madras for appointment as Director of the Institute.

LEAVE.

Brevet-Colonel S. R. Christophers, C.I.E., I.M.S., Director, Central Research Institute, Kasauli, is granted leave on average pay for 8 months combined with leave on half average pay for 2 months, with effect from the 1st April, 1928, or any subsequent date from which he avails himself of it.

Lieutenant-Colonel J. K. S. Fleming, O.B.E., I.M.S., Deputy Director-General, Indian Medical Service, is granted leave on average pay for 3 months and 16 days under Fundamental Rule 100 (a) (i), combined with leave *ex-India* for 4 months and 14 days under Fundamental Rule 100 (a) (ii), with effect from the 24th March, 1928, or date of availing.

Lieutenant-Colonel T. C. McCombie Young, M.D., D.P.H., I.M.S., an Officer of the Medical Research Department on foreign service under the Indian Research Fund Association, is granted leave on average pay for 4 months (including privilege leave for 60 days under military rules) combined with furlough *ex-India* for 4 months, with effect from the 1st May, 1928, or date of availing. His services are replaced at the disposal of the Director-General, Indian Medical Service, with effect from the date on which he proceeds on leave.

Lieutenant-Colonel F. A. F. Barnardo, C.I.E., C.B.E., Civil Surgeon, Scamptore, is allowed leave from the 20th February, 1928 (or any subsequent date on which he may avail himself of it) to the 3rd June, 1929, viz., leave on average pay for 5 months and 19 days under rule 81 (b) (i) of the Fundamental Rules, and leave on half average pay for the remaining period under rule 81 (d) of those rules.

Lieutenant-Colonel Alexander Dron Stewart, M.B., F.R.C.S.E., I.M.S., Professor of Hygiene, School of Tropical Medicine and Hygiene, Calcutta, and Officiating Principal, Calcutta Medical College, is allowed leave on average pay for 3 months, with effect from the 16th July, 1928, under rule 81 (b) of the Fundamental Rules,

in combination with the School vacation beginning from the 15th April, under rule 82 (d) of those rules.

PROMOTIONS.

Lieutenant-Colonel to be Major-General.

R. W. Anthony, M.B., C.M., F.R.C.S.E., *vice* Major-General A. Hooton, C.I.E., K.H.P. Dated 10th January, 1928.

Captains to be Majors.

A. M. Ghosh, M.B. Dated 19th February, 1928.
W. E. R. Dimond. Dated 26th January, 1928.
Ram Chandra Malhotra, O.B.E., M.B. Dated 18th October, 1927.
Henry Caldwell Tait, M.B.E., M.B. Dated 2nd February, 1928.
Jotish Chander Chukerbuti, M.B. Dated 17th February, 1928.

Lieutenant to be Captain.

S. P. Joshi, M.B. Dated 25th May, 1926.

The promotion to his present rank of Major S. R. Prall, M.B., notified in Army Department Notification No. 1031, dated the 20th August, 1927, is antedated from the 18th August 1927 to the 18th February, 1927.

RETIREMENTS.

Colonel C. R. Bakhle, K.H.P., I.M.S. Dated 12th February, 1928.
Colonel K. V. Kukday, I.R.C.P. & S., C.I.E., I.M.S. Dated 15th March, 1928.
Lieutenant-Colonel H. M. Inman, I.M.S. Dated 26th January, 1928.
Lieutenant-Colonel A. W. C. Young, M.B., I.M.S. Dated 29th January, 1928.

NOTES.

THE KAHN TEST FOR SYPHILIS.

A SMALL brochure issued by the Scientific Supplies (Bengal) Co., 29-30, College Street Market, Science Block, Calcutta, at four annas a copy is a reprint of an article by Dr. E. Muir in the *Journal of the Christian Medical Association of India*, Vol. I, No. 5. As readers of our journal well know, Major Lloyd and Dr. Muir have now for several years stressed the importance of syphilis as a contributory factor in causing the persistence and extension of leprosy lesions.

The Kahn test has undoubtedly come to stay, for its reliability appears to be as great as that of the Wassermann test, whilst its technique is simple, easy, and calls for no specially elaborate apparatus. The Kahn test depends upon precipitin reaction, as against complement deviation in the Wassermann test, whilst the former does not need an incubator, and results can be read at a glance.

The chief difficulty in the Kahn test is the preparation and titration of the antigen. This, however, can be overcome by buying standard antigen on the market, as the antigen is stable and keeps well.

The small brochure issued by the Scientific Supplies Co. details the method of carrying out the test, together with a short price list of apparatus and reagents required, and will be of interest to general practitioners who carry out the test.

BRAND'S ESSENCES.

"A good wine needs no bush," and Brand's Essence of Chicken is so well-known and appreciated that it scarcely calls for much comment from us. The firm of Messrs. Brand and Co. have been specialists in invalid diets for nearly ninety years, and during the whole of that time have held the appointment to supply their products to the Royal Household.

Brand's Essence of Chicken is a readily palatable and valuable article of diet in all cases of gastric disorder, fevers, impaired digestion, and severe prostration from any cause. In the tropics it is probably best administered iced in teaspoonfuls; whilst it is a favourite prescription with medical men all over the world. The Indian representative of the firm is Mr. A. H. P. Jennings, Block E., Clive Buildings, Calcutta, who will be pleased to supply literature and price lists.

'SALVITÆ' IN INFLUENZAL COLDS.

It is now generally believed that the micro-organisms which are responsible for influenza and for the common cold are filter passers of *Bacterium pneumosintes* type, and either closely allied or identical. Further, the mildly febrile state associated with the common cold is accompanied by a lowering of the body's alkali reserve, whilst in bronchitis with dyspnoea there is definite acidemia owing to the accumulation of carbon dioxide in the blood. It is claimed therefore by the American Apothecaries Co., the makers of 'Salvitæ,' that this product is especially indicated in the treatment of and prophylaxis against influenzal colds. Its composition per 100 parts is stated to be as follows:—

Strontii lactas	..	0.30
Lithii carbonas	..	0.15
Caffein et quininæ citras	..	0.80
Sodii-forma-benzoas	..	1.60
Calcii lacto-phosphas	..	0.15
Potassii et sodii citro-tartras	..	59.00
Magnesii sulphas	..	8.00
Sodii sulphas	..	30.00

'Salvitæ,' it is claimed, is an effective diuretic, diaphoretic, and a gentle laxative. It is claimed that its depurative effects check intestinal fermentation, and that it is particularly indicated in deficiency states characterised by fatigue, exhaustion, and acidosis. As a prophylactic it can be taken in small doses daily, whilst in the actual treatment of a cold the dose is a teaspoonful in a glassful of water every four hours.

The Indian agents are Messrs. Muller, MacLean and Co., 8, Old Court House Corner, Calcutta.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

Annual Subscription to "*The Indian Medical Gazette*," Rs. 16 including postage, in India. Rs. 18 including postage, abroad.

Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

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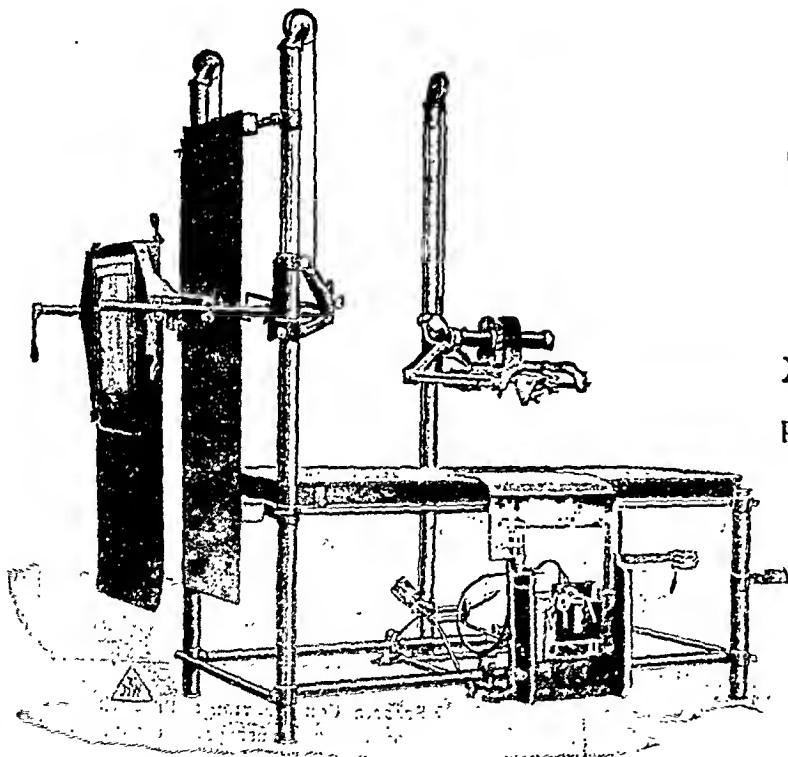
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THE "HOLWAY" COMBINED TABLE and UPRIGHT STAND

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Radiography up to
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471-3, HORNSEY ROAD, LONDON, N. 19

PURGATIVES CAUSE CONSTIPATION AND PREVENT BOWEL "HABIT TIME."

(A reprint of page 8 taken from the
treatise "Habit Time.")

THE purgative causes a harsh, chemical action in the bowel. It sets up violent irritation and inflammation.

The bowel, being obliged to expel this purgative irritant, whips the muscles into forced activity; the adjacent tissues are drained of moisture, diluting and liquefying the intestinal contents, producing precisely the same physiological effect on the bowel as it would undergo in a defensive effort to eliminate the poisons in diarrhoea. This disrupts every normal functional activity; abnormal faecal consistency is brought about and regular time for bowel movement is impossible.

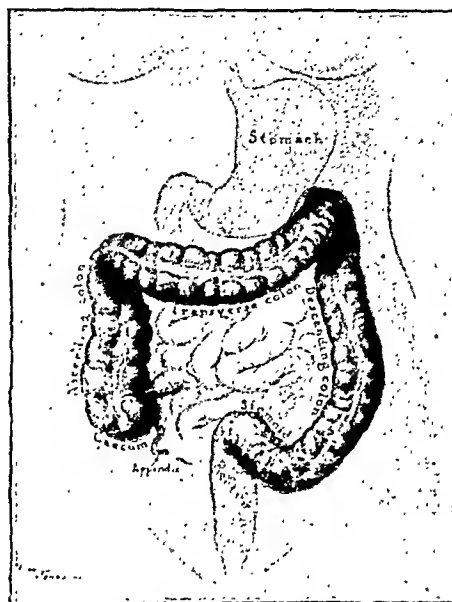
As a result of this terrific exertion the muscles of the bowel are exhausted and according to nature's rule a period of rest and recuperation must follow. This inactivity may extend for a period of twenty-four to forty-eight hours. During this time accumulation again takes place. Another purgative dose is called for and the whole process is repeated over and over again until the normal, delicate and sensitive mechanism becomes chronically inflamed and thus accustomed to a severe irritant it will not function by any stimulation less severe than the one to which it has become habituated.

This is the way the continued use of the pernicious purgative actually defeats the very object for which it is taken. Instead of benefiting, the purgative aggravates the condition already existing or actually causes sluggish bowels and constipation.

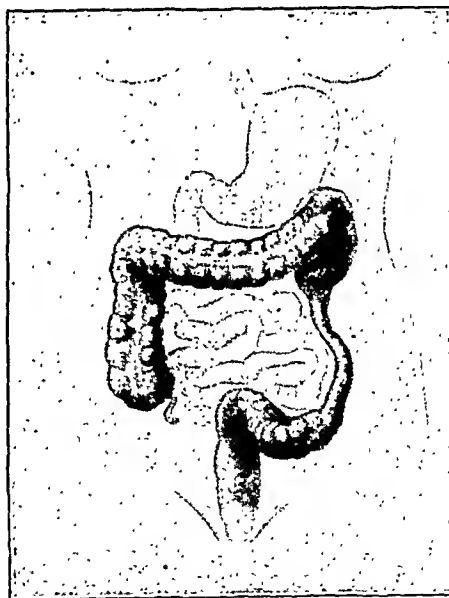
Doctors, everywhere, in their eagerness to avoid cathartics, rapidly adopted paraffin. This, however, has failed, as it has many disadvantages and has apparently been completely replaced by Petrolagar Therapy.

Petrolagar, with its bland, soothing action, is clearly indicated in the various types of constipation including spastic type as illustrated above.

TWO ILLUSTRATIONS TAKEN FROM "HABIT TIME."



PHYSIOLOGICALLY CORRECT PICTURE
OF NORMAL COLON.



SPASTIC CONSTIPATION: PINCHING
DOWN OF THE DESCENDING COLON.

"Habit Time" is a comprehensive treatise on the physiology of the bowel, now in its eighth edition, two hundred thousand copies of which have been issued for the Medical Profession. A free copy will be sent to Doctors in India upon application to Smith, Stanistreet & Co., Ltd., Calcutta; Kemp & Co., Ltd., Bombay; or Spencer & Co., Ltd., Madras.

"Petrolagar" is the trade mark distinguishing the fine emulsion of mineral oil and agar-agar, issued in four varieties: Plain, with Phenolphthalein, Alkaline, and Unsweetened. Manufactured only by Deshell Laboratories, Ltd., London, No. 16.

Original Articles.

MICROCEPHALY: A REPORT ON "THE SHAH DAULAH'S MICE."

By C. LODGE PATCH, M.C.,

MAJOR, I.M.S.,

Medical Superintendent, Punjab Mental Hospital,
Lahore.

SCATTERED over this continent of superstition and credulity are many shrines of varying repute. At some specific diseases are miraculously cured, at others divers boons are granted. In a land where sons are a social and religious necessity, it is not surprising that there should be a large number of shrines with a reputation for supplying children to barren women. One of these is the ziarat of Shah Daulah.

Shah Daulah was a Mussalman saint who lived during the reigns of Akbar, Jehangir, Shah Jahan, and Aurangzeb. He died in 1676 at the age of ninety-five. He was a broad-minded, philanthropic individual, and succoured all who came to his shrine irrespective of caste or creed. A Hindu, Raja Chattar Singh of Rajour, was one of his disciples. He was especially kind to all dumb animals and had a great influence over birds and deer. He was responsible for the building of several of the bridges across the Chenab and its tributaries. These must have saved numerous lives for floods are frequent in the country around Gujrat, and even to-day it is not uncommon for villagers to be drowned in flood-time. Many miracles have been attributed to him, and these have enhanced his fame, but his name is chiefly associated with the "Shah Daulah's Mice," a curious type of imbecile with a microcephalic head which slopes sharply backwards producing a strangely rat-like appearance.

Certain superstitions and traditions have been handed down regarding these unfortunate creatures. In the earliest times women who came to the shrine made a vow that when the promised child was born, it would be handed over to serve the saint. It is said that this first-born was usually a "chuha" (a rat). After the death of Shah Daulah the vow was amended. The woman was permitted to make a monetary donation in lieu of sacrificing her child. The first child was not necessarily a chuha, but if the mother neglected to pay the money she had promised, a curse befell her and the next child was born a chuha. This curse continued to operate and chuha after chuha would be born until the promise was fulfilled. The alteration in the vow and the superstition can be explained logically. Shah Daulah was a philanthropist, a lover of animals and all weakly subjects.

He also possessed an enormous personal reputation as a saint, so there was no shortage of alms and donations during his life time. The shrine, however, is a poor one and has no *maufi* (land and revenue) attached to it. While Shah Daulah could well have afforded to support the imbeciles presented to the shrine, his successors must have found that subscriptions were not coming in as rapidly as before. A promise of hard cash would naturally be of more use to them than an extra mouth to feed. Indigent parents might continue to dedicate their defective children to the shrine, but the well-to-do classes would prefer to retain their children, imbecile or otherwise, and to escape the anger of the deceased saint by the alternative offering. This suited both parties, and it remained only for the priests to intimidate the anxious parents with the threat that subsequent children would surely be chuhas if the vow were forgotten.

References can be traced to only three medical papers on the subject of the chuhas. The earliest was written in 1868 and the latest in 1903. Theories as to how these creatures are produced have been put forward both by medical and lay writers, but the question of artificial creation has always been left in a state of doubt and uncertainty. A belief which is almost universal throughout the province is that the priests, by means of iron caps, compress the heads of children in such a way that they are reduced in size and exhibit the characteristic shape of Shah Daulah's mice. Even intelligent individuals, some of them doctors, believe that this abominable practice is secretly carried out. This theory will be fully discussed in later paragraphs. Other suppositions are that the microcephalic imbecile is the result of the mating of the hitherto barren mother with a chuha during the course of the period she spends at the shrine in prayer, or in the performance of whatever religious rites have to be carried out. This might account for the first child being born a chuha, but it is a theory which is discreditable to the morals of the woman and of the priests. It is one, however, which is not impossible, although it must be remembered that idiots and imbeciles tend to be sterile, and Sir Frederick Mott has shown that this is a provision of Nature to eliminate the unfit.

A third surmise is that of maternal shock or suggestion on the unborn child. It is not possible scientifically to estimate the effect of certain influences on the pregnant mother, but the belief that such influences can act has been held from the very earliest times. It is recorded in Genesis xxx. that Jacob entered into an agreement with Laban that he would work for him and look after his herds of cattle and flocks of sheep, if he were allowed to take as his share all such cattle and sheep

as were spotted, speckled, and ringstraked with white. "And Jacob took him rods of green poplar, and of the hazel and chestnut tree; and pilled white strakes in them, and made the white appear which was in the rods. And he set the rods which he had pilled before the flocks in the gutters in the watering troughs when the flocks came to drink, that they should conceive when they came to drink. And the flocks conceived before the rods, and brought forth cattle ringstraked, speckled, and spotted." The evidence for this theory is far from conclusive, but, as in the case of Laban's cattle, it is just possible that a pregnant mother may be affected by external influences, and these may have an effect upon the appearance and the destiny of her unborn child. To wit, she might be subjected to the frequent presence of a terrifying chuha coupled with the guilty knowledge of an unfulfilled vow. But no real facts support this theory.

Microcephalic imbeciles are found in all parts of the world who, in appearance, are indistinguishable from the chuhas of Gujrat. A skull is said to be microcephalic when its circumference is four or five inches below the normal. Thus in Europe a skull of 17 or 18 inches would be regarded as microcephalic. Man differs from the lower animals in the relative size of his cranium as compared with the size of his face. Any physical peculiarities which increase the relative size of an individual's face, such as prognathism; or which reduce the relative size of the cranium, such as microcephaly, will tend to give the individual the appearance of an animal. Microcephaly further tends to create this impression of animalism because the skull differs from the normal not merely in size but also in shape. Shuttleworth and Potts observe that such heads recede sharply from the brow, have a pointed vertex, and a flattened occiput so that they show two distinct angles, one at the forehead and the other at the vertex. This is so constant and pathognomic a feature that they do not feel justified in applying the term "microcephalic" to skulls which are merely reduced in size and do not show the typical shape associated with microcephaly. Tredgold goes further and states that typical microcephalics are found with a cranial circumference of nineteen inches or more. He has diagnosed the condition in a skull of twenty-one inches; and adds, "The actual brain capacity is less than a mere circumferential measurement would suggest, by reason of the deficiency being chiefly in the upper parts of the skull."

Eastern imagination has coined the name "chuha," but the similarity of microcephalics to the lower animals has frequently been remarked by Western alienists. Pinel in his "Traite Medico-philosophique sur l'aliendation Mentale" describes a young female idiot

of eleven years who bore a most striking resemblance to a sheep both in her appearance and in her mode of living. Cole and Clouston comment on their similarity to birds. The latter states, "Very typical microcephalics are rare, but, when seen, they make a strong impression. With their bird-like profiles they look so impish and unearthly." Lombroso has described a bird-man, a goose-man, and a rabbit-man, all microcephalics. Dr. Nolan, in the *Journal of Mental Science* for January 1904 gives this amusing description of a microcephalic idiot:

"His physical appearance would have rejoiced the heart of an evolutionist; as *primâ facie* he was a perfect specimen of the simian type. . . H. C. however, was as far below the level of average ape, as the latter is inferior to the highly developed specimen ("Consul") at present, the delight and wonder of a London Music Hall, where, in spotless regulation garb, he discusses with evident appreciation and discrimination the elaborate menu set before him. H. C. if placed before such a meal would have brought his voracious appetite to bear not only on the viands, but on the napery, glass, and cutlery, and by preference would probably try the latter as a *hors d'œuvres*." The tall chuha on the right of the group (Fig. 1) could just as aptly be compared to a sheep, a bird, a rabbit, or a monkey, as to a rat.

The opinion of scientists as to how microcephaly is caused has changed considerably in the last few years. The earliest theory was that it is an atavistic variation, a throw-back to an animal existence: support was lent to this view by the facial appearance of the imbecile. Later, at a time when it was recognised that certain other abnormal skulls owed their deformity to irregular and too early closure of certain of the sutures, it was thought that microcephaly was due to some sort of universal synostosis. On this misconception, Lannelongue performed craniectomy in a number of cases "in order to allow the brain to expand." This operation was found to be utterly useless: indeed, in some cases, the skull became smaller. All modern authorities have now come to the conclusion that the skull conforms to the size of the brain, and not *vice versa*. Stoddart says, "Smallness of the head is due to the smallness of the brain." Shuttleworth and Potts state, "the small skull is merely the envelope of the brain on which the normal development has been arrested, probably about the fifth month of gestation." It would be wasteful for Nature to build an abnormally sized brainbox for an abnormally small brain, and Nature abhors waste, to say nothing of a vacuum. When the occasion demands it, she provides a macrocephalic skull with a circumference of as much as 37 inches to accommodate a hydrocephalic brain, a brain distended with fluid. As a case in point there is in the museum at Marseilles the skull of

Borghini which is 12" high and 36" in circumference. The owner was a four-foot dwarf and a hydrocephalic idiot. A term of contempt for the intellectual powers of a rival, and one which exists down to the present day is, "He is as wise as Borghini!" Tredgold discusses briefly the reasons why science has discarded the earlier theories as to the causation of microcephaly and concludes, "the real truth is that microcephaly is neither atavistic nor accidental, but the result of inherited blight, just as amentia in general. In most of the cases which I have examined morbid inheritance was present. In fact, microcephalics usually come of a pronounced neuropathic

gave an excellent account of himself; said he was a "pir" and prayed at the houses he visited; he stated that twenty-five years ago he had been at the shrine of Shah Daulah and returned to Gujrat occasionally; he denied ever having had sexual intercourse as he was a holy man and above such things. He accepted only food and refused a monetary offering. He was scrupulously clean in his dress and person. He had a very shrewd idea of the prices of food-stuffs, knew that there were sixteen annas in a rupee and eight pice in a two-anna bit, and probably had a greater degree of intelligence than most villagers in the Punjab.



Fig. 1.

stock. Their brothers and sisters are often typical degenerates, and frequently one or more of them suffer from the same condition."

The milder degrees of microcephaly are not necessarily associated with idiocy or imbecility. In perfectly normal individuals the size of the head varies considerably as any hatter will testify. Eugene Talbot, in his "Degeneracy: Its Causes, Signs, and Results," states that Descartes, Foscolo, and Schumann were sub-microcephalic; that Donizetti and the poet Shelley had exceptionally small heads, the latter showing other stigmata of degeneration as well. The grosser degrees of microcephaly, however, are usually (some say invariably), accompanied by a greater or less amount of mental deficiency. The majority of chuhas are incapable of speech, but Peterson observes that, "like an animal the idiot may be intelligent but speechless. The development of language and intelligence is not parallel." A certain number of chuhas can get about the country alone, speak quite well, and take care of themselves. One such was found wandering about the Mall in Lahore and was examined at the Mental Hospital. His cranial circumference was slightly over 18 inches, but in appearance he was a typical chuha. He

The popular belief that chuhas are artificially produced by the priests is strengthened by the fact that in other districts of the Punjab and in Sindh the heads of young children are moulded so that in later years they will conform to certain standards of beauty. The protruding foreheads of the Sindhia women are caused by pressure on other parts of the cranium. In the western parts of the Province, such as Multan, Muzaffargarh, etc., aesthetics demands a flattened occiput, so the mother lays the newly-born infant on its back with its head resting on a brick or a baked tile. This position is maintained for several months, and, if necessary, the limbs of the infant are tied down to prevent it from rolling over on its side. Manipulative and manual pressure are also employed on the back of the child's head in order to obtain the desired result. As a consequence of these, any man from Multan will remove his pagri and exhibit his occiput as a thing of beauty. Such skulls are distinctly brachycephalic. Lyons and Waddell in their "Medical Jurisprudence for India" give the average cephalic index of the Baluchi skull as 88.0, while their average for the other parts of the Punjab where this practice is not carried out is only 73.5. India is

not the only country in which artificial moulding of the head is carried out. It occurs among the North American Indians and in certain savage tribes of Africa; Hippocrates and Strabonius mention the practice in their works, and, in more recent times, Delisle writes of the artificial compression of infantile heads in the Toulouse district of France. He emphasises the fact that no mental impairment is produced by such head-moulding, and of course none can be attributed to the practice in Multan.

The artificial pressure as applied in Sindh, Multan, and elsewhere is localised. It is not universally applied over the whole cranium. Its primary effect is a compensatory enlargement in those parts of the skull which are not subjected to pressure: in the case of the Sindhia women the forehead protrudes, in the case of the Multan skull there is an increase in the transverse diameter which considerably raises the cephalic index. The skull, however, as mentioned above, is a comparatively tightly fitting envelope for the brain, and its size corresponds to the size of the brain enclosed within. While localised pressure during the first few months of life will certainly cause an alteration in the *shape* of the head, no amount of pressure, localised or otherwise, can cause an appreciable reduction in the cubic capacity of the cranium. The only effect that one would expect from any attempt to reduce the *size* of this closed receptacle would be clinical symptoms of compression which would result in death if the pressure were not relieved.

Another effect of pressure on any part of the skull during infancy is the obliteration of the normal bony prominences and landmarks in the area over which pressure had been applied. In the heads of individuals from Multan and Muzaffargarh, the external occipital protuberances are neither visible nor are they easily palpable. Not only were these palpable in the skull of every chuha examined, but all the other bony landmarks could also easily be felt under the scalp. The scalp of microcephalic imbeciles is usually thick and loose, and often thrown into rugose furrows; but an exception was found in the case of the chuha on the right of the group (Fig. 1). In this chuha the scalp was thin and closely adherent to the skull. In the first photograph the frontal eminences stand out clearly, in the second photograph, showing a three-quarter back view, one can distinctly see the external occipital protuberance and also the temporal ridge, which is not ordinarily visible even in a perfectly normal skull. After the fashion of Mohammedans, this chuha's head had recently been shaved, so the bony landmarks are more obvious to the naked eye.

The fiction, however, that chuhas are produced by mechanical contrivances is likely to continue so long as human nature is unaltered.

It is only natural for the mass to cling to a fantastic and sensational explanation when some simpler one would serve equally well. It is only human for the general public to entertain the worst possible opinion of an individual under suspicion. Local gossip whispers that from time to time children have escaped from the shrine and have spread tales of torture by the application of iron caps. This would revive popular interest if ever it showed signs of waning. Thus the ridiculous theory continues from one generation to another, incapable of escape from the vicious circle in which it travels. Psychopathic children with a craving for sympathy and notoriety are found, like microcephalic imbeciles, in every part of the world. But their

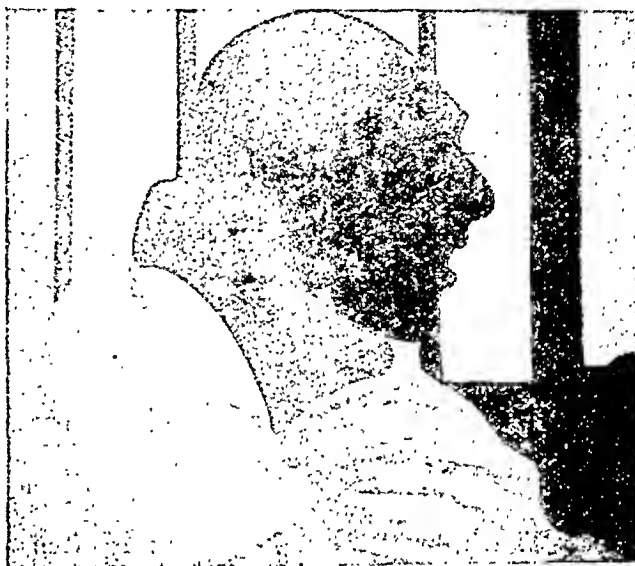


Fig. 2.

statements must always be accepted with reserve. During the eighty years of British administration not a single charge of such malpraxis has been brought against the priests at the shrine of Shah Daulah, and any allegations of these criminal practices put forward by a child must certainly have been followed up by the police and found to be without truth or foundation. All records, and the priests themselves, state that children are not admitted to the shrine till they are a few years old. At this age artificial compression would probably be ineffective in producing an alteration, even in the shape of the skull. Moreover, from the point of view of commonsense and expediency, it is impossible to believe that the priests would apply an iron cap or any other form of pressure to the head of a child who could talk and so retail its experiences in evidence against them.

Thus whether one approaches the problem anatomically and clinically or legally and sociologically, the result is the same. The balance of probability is opposed altogether to

the theory of artificial production by mechanical means. The priests, however, do not appear ever to have taken any active steps to contradict or dispute this theory. The reason for their silence is not hard to find. They are astute individuals, and, like cinema stars, have a due appreciation of the value of advertisement. The more mystery that surrounds a shrine, the better will be the business. Perhaps, too, they realise that fewer servitors and more subscriptions will result from a suspicion in the lay mind that they torture their charges.

There is no doubt that a certain number of the chuhas attached to the shrine come direct from their mothers. Whether or not a woman was under a vow to dedicate her child to the shrine, she would recognise that it bore the hall mark of Shah Daulah, the patron saint of such imbeciles, and she would feel that she

kidnapping trade in Jummū and Poonch from which districts a large number of chuhas were received. In the very earliest times all the chuhas were kept permanently at the shrine, but at the time when "The Chronicles of Gujrat" was written, a limited number were hired out to *faqirs* at the rate of from Re. 1-8 to Rs. 2 per month. These returned to the shrine three times a year, at the feasts of Id-ul-Fittar, Id-ul-Zuha, and the Urs or tenth day of Muharram, when melas or fairs were held. The priests state that, nowadays, none of the chuhas is retained for service at the shrine, but all are "on the road," each in charge of its keeper; melas are no longer held at the shrine, nor is there any obligation for the chuhas to return at stated intervals. Chuhas are used solely as beggars, and their commercial value as solicitors of alms is enhanced by the superstition that any woman



Fig. 3.

was performing a meritorious action in handing it over for service at the shrine. The great majority of the chuhas come from the poorest classes, and the upbringing of a congenital imbecile must present a serious economic problem in a land of large families. The population of India is three hundred and twenty millions, and a considerable number of microcephalics must be born each year. Flora Annie Steele in "The Five Rivers" suggests another way in which the supply of chuhas might be augmented, viz., that the priests of the shrine get in touch with the mothers of these abnormal children through agents all over India, that the normal babies who are presented to the shrine are exchanged secretly for the microcephalic infants, and thus the prestige of the shrine is maintained.

"The Chronicles of Gujrat," written a generation ago, alleges that the priests were associated with the *Barda-Faroshi*, or

who refuses a dole to these wretched creatures will incur the displeasure of Shah Daulah and her next child will be born in the form of a chuha.

Arrangements were made for collecting as many chuhas as possible at the ziarat of Shah Daulah, but in spite of a fortnight's notice the priests were able to produce only three real chuhas. They also brought forward four other imbeciles who did not conform to the true microcephalic type, and tried to pass them off as the real thing. They say that chuhas are sent very far afield in these days, and this is probably true, owing to the increased facilities for railway transport and the fact that there is no longer any necessity for them to return to Gujrat from time to time. It would appear also that, in this commercial age, the priests have discovered that other types of imbecile can profitably be used as substitutes for the microcephalic which is associated with the name of Shah Daulah.

COMPRESSION FRACTURES OF THE SPINE.

By E. W. C. BRADFIELD, M.S.,

LIEUTENANT-COLONEL, I.M.S.,

CAPTAIN T. W. BARNARD, M.S.R., F.R.P.S.,

and

R. MAHADEVAN, M.B., B.S.,

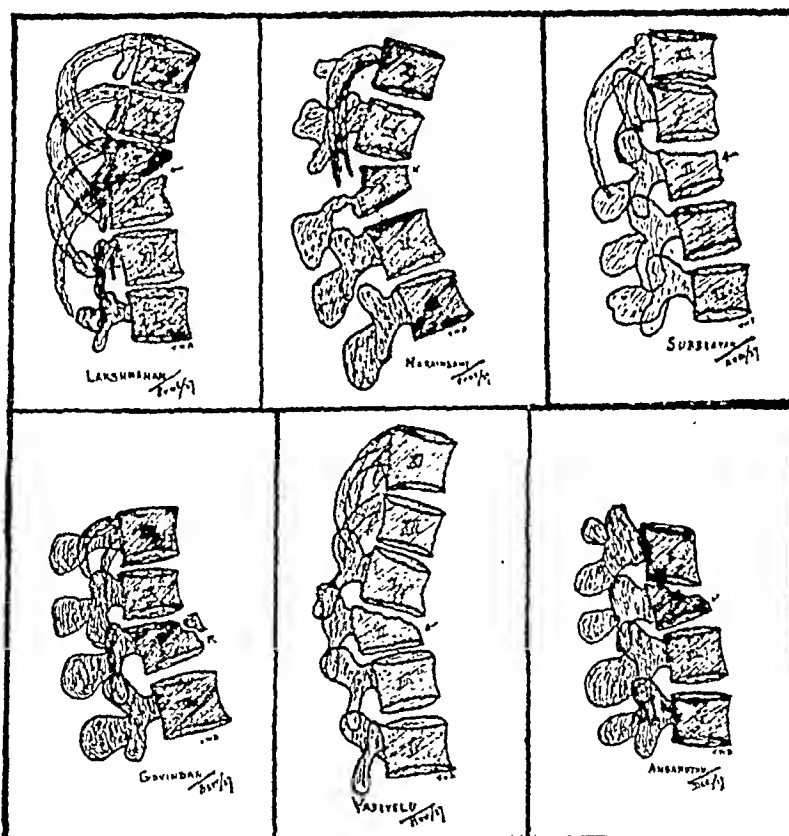
Government General Hospital, Madras.

SEVEN cases of "traumatic spondylitis" which were admitted in the senior author's wards during the past year and whose notes have been collected by his House Surgeon, Mr. R. Mahadevan, suggest that compression fractures of the vertebræ are not so rare as is commonly supposed. Obscure back injuries to coolies engaged in lifting heavy bales or to toddy-drawers who fall from a tree directly on to the buttocks are often of this nature. The illustrations are pantograph drawings taken by Captain T. W. Barnard from the original

hospital after nearly 12 months, able to walk and fit for light work.

2. Narayanswami, peon, 30 years, male, Hindu, fell from a cocoanut tree on his buttock a month before admission to the hospital and was unable to get up for a fortnight. Walks with stoop and a rigid back. Prominence in the region of 11th dorsal to 1st lumbar spine. No paralysis of muscles or loss of sensation. X-ray showed fracture of body of 1st lumbar vertebra, wedge-shaped. Left hospital after three months, completely relieved, able to walk and return to work.

3. Lakshmanan, aged 25, male, Hindu, was lifting a heavy log of wood on one shoulder and suddenly felt severe pain in the middle of the back and sides, but did not fall down. Complains of difficulty in movement in the region of 10th dorsal vertebra and tenderness over the spine below the 8th dorsal vertebra. No nervous disturbance whatever. X-ray showed disorganisation of 10th and 11th dorsal vertebral bodies. Albee bone-graft operation.



radiographs and show the bone lesions very clearly.

1. Vadivelu, ryot, aged 18, male, Hindu, fell from a cocoanut tree 30 feet high on to his buttocks, 10 days previous to admission. Complains of inability to walk and pain in both hips. There was pain, tenderness and rigidity over the lumbar spine; no paralysis of muscles or loss of sensation. X-ray showed fracture of the body of the 2nd lumbar vertebra. Left

Left hospital after six months; pain almost completely relieved and patient walks about with comfort.

4. Angamuthu, cooly, aged 35, male, Hindu. A heavy weight fell on his back, complained of pain in the back when walking or standing up, pain and tenderness over the 2nd, 3rd and 4th lumbar spines. No nervous symptoms whatever. X-ray showed compression fracture of the body of the 2nd

lumbar vertebra. Left hospital after five days rest. Refused to stay till complete relief.

5. Subbarayan, cooly, aged 30, male, Hindu. A rice bag fell on his back from a cart two hours prior to admission to the hospital. Pain and swelling (hæmatoma) over the region of all the lumbar vertebræ. No paralysis, no disturbance of sensation. No loss of sphincter control. Pain in the region of the lumbar spines. X-ray showed compression fracture of the 2nd lumbar vertebra. Left hospital after one month. No pain or rigidity of spine.

6. Subramanian, aged 30, male, Hindu. A heavy weight fell on his back two years before admission to the hospital. Had pain in the inter-scapular and shoulder regions. Continuous severe pain in the upper dorsal region but no limitation of movement. Pain most marked in the region of the 3rd, 4th and 5th dorsal spines. No nervous symptoms whatever. X-ray showed fracture of body of 4th dorsal vertebra. Left hospital after ten days with symptoms relieved.

7. Govindan, ward boy, aged 30, male. Other caste. Fell from a tree 30 feet high; could not sit up or walk; pain in the back and tenderness over 2nd and 3rd lumbar spines. No nervous disturbance whatever. X-ray showed fractured body of the 2nd lumbar vertebra. Left hospital after two and a half months. Completely relieved.

Treatment of these patients once the lesion is recognised is easy and simple. An extension applied to both lower limbs and tied to the foot of the bed, which is raised to produce counter-extension by the patient's own body weight, is all that is necessary. In one patient an Albee bone-grafting operation was performed and was very successful, though one is not convinced that a simpler non-operative treatment might not have produced an equally good result.

In previous annual reports the senior author has recorded two patients—both boys—who had a compression fracture of the atlas vertebra following a fall from a height without any cord lesion, and who both recovered completely.

A SIMPLE RAT-TRAP USED BY THE SHAN VILLAGERS OF THE NORTHERN SHAN STATES, BURMA.

By G. G. JOLLY, C.I.E., M.B., D.P.H., D.T.M.,
LIEUTENANT-COLONEL, I.M.S.,

Director, The Harcourt Butler Institute of Public Health,
Rangoon.

Two specimens of rat-traps in use by Shan villagers in the Northern Shan States of Burma have been sent me by Major H. F. L. Duckworth, I.M.D., Civil Surgeon and District Health Officer, Northern Shan States. These traps are of great interest because of their

ingenuity and simplicity of construction. They can be made up in any bamboo-growing country at next to no cost because they are constructed solely of bamboo wood and string.

Fig. 1 shows the trap in the "released" position. C is the chamber, a short length of bamboo of from 3" to 4" diameter and about 11" to 16" in length. One end of the bamboo is left open to form the entrance to the trap, while the other is closed by the natural "node" of the bamboo being left in position. In the trap illustrated, which is of fairly thick bamboo, the bottom is flattened down so that the

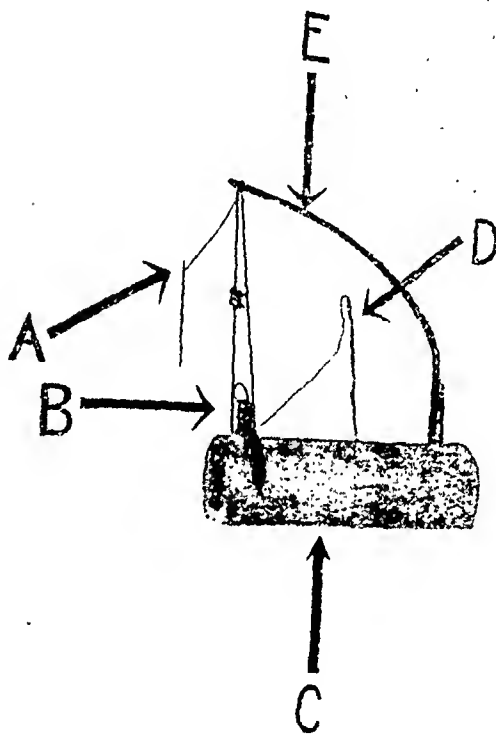


Fig. 1.

trap will stand by itself on the ground. In another model the natural curve of the bamboo is left and this trap has to be propped up against some adjoining object when set.

B is the trap-door, made of a flat disc of wood which drops down into a slot cut in the upper part of the chamber. The slot is almost $\frac{1}{2}$ inch wide and extends the full width of the bamboo. The door fits loosely into it. On each side of the door a shallow groove is cut to take the string which operates the door mechanism. This string passes through a small hole observable on the side of the trap chamber just below the slot. A similar hole is present on the other side of the trap. At the top of the trap-door there is a small loop of string into which the thick end of the pin A is inserted when the trap is set. Whilst this is the arrangement in the trap illustrated, another model which I have has a small hole

drilled through the projecting upper end of the trap-door to take the thick end of pin *A*.

E is the spring of the trap, made of a bent strip of bamboo wedged at one end into the trap chamber and having the string operating the trap-door passing over the other end, and held in position by a small notch on either side. The tension of the bent bamboo holds the door tightly closed.

D is a bamboo peg which has two notches cut on it. This peg slips into a small round hole in the top of the trap chamber. The lower notch prevents the peg from slipping out, while the thinner end of the pin *A* engages in the upper notch when the trap is in the "set" position.

A is a tapering pin made from bamboo, attached about half an inch from its thicker end, by means of a string, to the upper end of the bamboo spring *E*. In the "set" position this pin stretches across, more or less horizontally, from the loop at the top of the trap-door to the upper notch of the peg *D*.

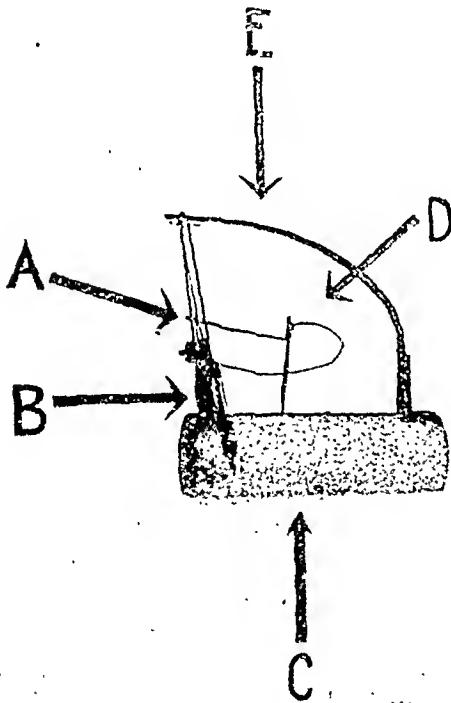


Fig. 2.

Fig. 2 shows the trap in the "set" position, and a comparison between the two figures will make the mechanism of the trap clear. To set the trap the spring *E* is pressed down and the trap-door raised. Peg *D* is placed in position, so that the lower notch engages with the edge of the hole in the top of the chamber. Pin *A* is then placed carefully in position. The trap-door is now held up by the pin *A*,

while the lower end of the peg *D* projects into the interior of the chamber.

To bait the trap all that is required is to drop a little rice or other bait into the chamber, so that it passes beyond the projecting lower end of the peg *D*. A rat on entering the trap cannot get through to the bait without disturbing the lower end of peg *D*, which dislodges the thinner end of pin *A* from the upper notch on peg *D*, thus enabling the spring *E* to straighten and slam the trap-door shut.

The writer is indebted to Major Duckworth for presenting these interesting traps to the Museum of The Harcourt Butler Institute of Public Health. The traps have been tested in the Institute and have been found highly efficient.

TUBERCULOSIS OF THE BODY AND CERVIX OF THE UTERUS.

By N. GUPTA, M.B.,

Clinical Pathologist, Medical College Hospitals, Calcutta.

THE most frequent site for tuberculosis in the female genital organs is in the Fallopian tubes. Tuberculous salpingitis usually occludes the inner portion of the tube, so that the tubal contents do not gain easy access to the uterine cavity.

When the corporeal endometrium is involved, the tubes are nearly always affected.

It is rather difficult to find tubercle bacilli in vaginal discharges from a case of tuberculous endometritis. If the endometrium is ulcerated and caseous material is being discharged, then possibly tubercle bacilli may be found.

Cases of tuberculous endometritis are rarely diagnosed clinically, and so they escape bacteriological examination of the leucorrhœal discharges.

Curettage of the endometrial cavity is a better method of diagnosis, and it is employed as a routine in the Eden Hospital for such purposes. It is a desirable procedure, as it clears up the suspicion of malignancy for which tuberculosis is often mistaken.

During the past four years a number of cases of tuberculosis of the body of the uterus and cervix have been encountered in the Eden Hospital, and the following are brief descriptions of the conditions present.

Tuberculosis of the cervix is a rare infection. It may be primary or secondary,—the latter being by far the more frequent. Tuberculosis by extension is by no means infrequent in the external genitalia.

In four out of six cases of cervical tuberculosis studied in the Eden Hospital, involvement of some portion of the genital tract above the internal os was recorded. In the other two the condition seemed to be primary in the cervix.



2

Fig. 1

3

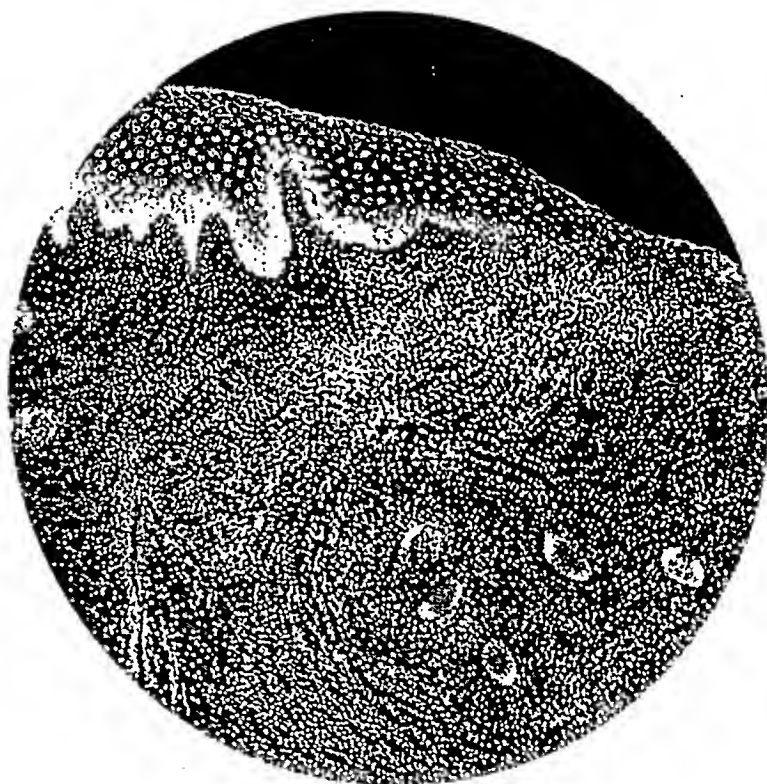


Fig. 2.

PLATE II.

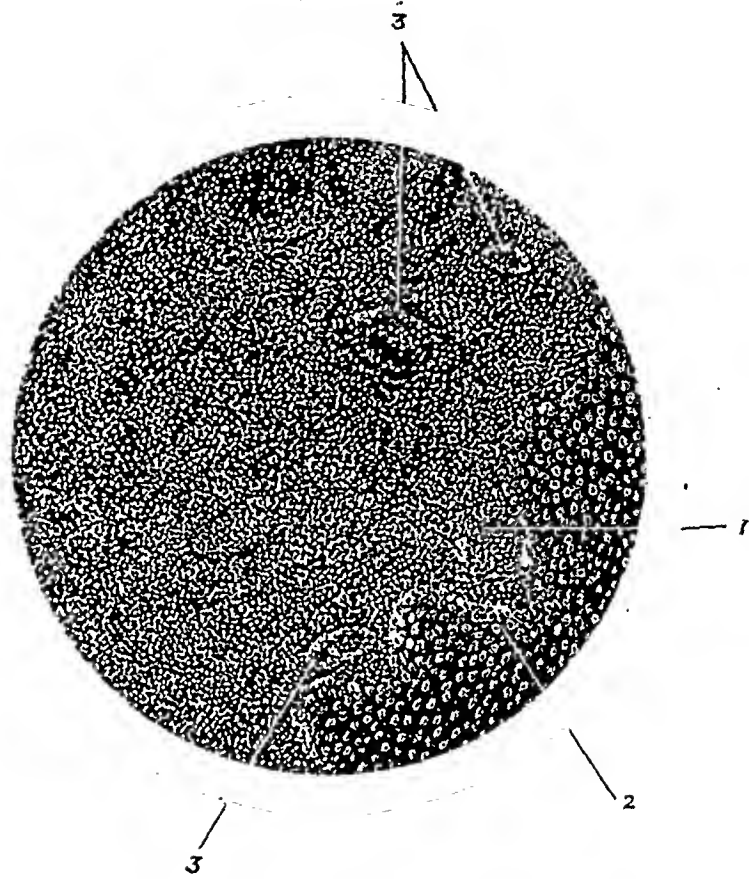


Fig. 3.

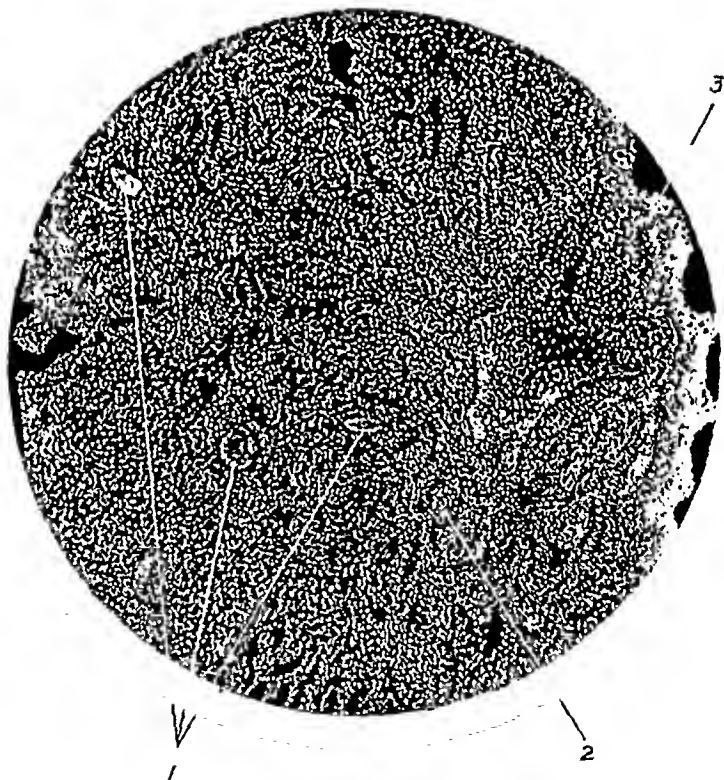


Fig. 4.

Primary lesions in the lungs are the most frequent occurring in tuberculosis, but none of these cases showed any evidence of pulmonary involvement. Pre-existing inflammation in some form is perhaps a predisposing factor, but nothing can be said definitely as to the etiology. No age is immune. Five of our cases occurred during the active sexual life.

Short histories and pathological reports of the cases encountered in the Eden Hospital are as follows:—

Case No. I. Tuberculous Endometritis.—Mrs. H., European female, aged 24 years, admitted in January 1923, for the following complaints:—

(a) An almost continuous sharp pain in the region of the left lower abdomen.

(b) Leucorrhœal discharge.

(c) Scanty irregular menses.

These symptoms began about three years previously.

There was no history or physical evidence of tuberculosis in any other part of the body.

Obstetrical History.—No child. No miscarriage. No abortion.

Examination per Vaginum.—One small tumour, the size of a large pea, felt on the right lateral wall of the uterus.

Patient admitted for fibroid of the uterus and dysmenorrhœa.

The uterus was curetted and the curettings were taken for pathological examination.

The shreds of mucosa removed by the curette were particularly friable and of a yellowish colour.

Under the microscope, characteristic nodules with epithelioid and giant cells were seen. There were collections of lymphocytes within the connective tissue, and the uterine glands were hypertrophied, showing proliferation of the epithelium (Fig. 1).

Case No. II. Tuberculous Cervix.—B., Hindu female, aged 40, admitted in July 1921, for the following complaints:—

(a) Blood discharge for a week after a period of amenorrhœa for 2 years.

(b) Pain in the pelvic region for 2 weeks.

(c) Increasing leucorrhœa for several months—rather thick, fetid, glairy material.

No evidence of tuberculosis in any other part of the body could be detected.

Obstetrical History.—Thirteen children, two abortions, last pregnancy ten years back.

14th July, 1921. *Examination per Vaginum.*—Uterus—small, lying anteverted. Anterolateral cul-de-sac, clear. Posterolateral cul-de-sac, fixed. Cervix felt to be swollen and somewhat œdematous. A small polypus projects from the posterior lip.

Inside, the cervix is nodular and hard.

With the Speculum.—A hard nodular lump of the size of a pea was projecting from the cervix. It was vascular and friable and clinically diagnosed as malignancy of the cervix, infiltrating the utero-sacral region.

A wedge-shaped portion of the tumour was removed for diagnosis.

Pathological Report.—Sections show fibrous tissue and benign adenomatous cervical glands and inflammatory changes. Giant cells are present.

Diagnosis.—Tuberculosis of the cervix.

19th July, 1921.—The patient was again examined and the condition found to be the same as before.

21st July, 1921.—The abdomen was opened and the peritoneum was found firmly adherent to the parietes.

On opening the peritoneum the intestines were found studded with miliary tubercles. The tubes on either side were similarly affected and matted together with the surrounding structures.

The cervix was again examined and found to be hard. A portion of it was removed for histological

examination. It cut with a grating sensation and there was no bleeding.

Section (Fig. 2) shows.—The squamous epithelium is intact. Typical tubercles with giant and epithelioid cells are present. There are also collections of lymphocytes in the connective tissue. The clinical similarity of this condition to that of malignancy is noteworthy.

Case No. III.—P., Hindu female, 24 years of age. For four months there had been increasing leucorrhœa. Physical examination did not show evidence of tuberculosis in any other part of the body. Examination of the cervix showed slight ulceration which was purplish in colour. The body of the uterus and its appendages seemed normal. Sections from the cervix showed the usual histological picture of tuberculosis (Fig. 3).

Case No. IV.—C., Hindu female, aged 21, nullipara, complained of leucorrhœa for several months. Menstrual history, normal. No evidence of tuberculosis in any other part of the body. Examination of the cervix showed it to be red and ulcerated and it felt as if it were malignant. Histological examination of a piece of the cervix showed it to be tuberculous (Fig. 4).

Case No. V.—M., Mohamedan female, aged 30 years, nullipara, had irregular menses and leucorrhœa for several months. She complained of irregular fever for some time. Examination showed the body of the uterus about three-fourths of the normal size, lying anteverted and freely movable. There was a large erosion of the cervix. The whole cervix was inflamed and more or less covered with papillomatous outgrowths which bled easily. There was a thick purulent discharge.

Physical examination of the lungs did not show any evidence of tuberculosis, but she had previously had a slight hæmoptysis. Pathological examination of a wedge-shaped piece from the cervix showed it to be tuberculous. Sections showed characteristic tubercular nodules with giant cells. Sputum negative for tubercle bacilli.

Panhysterectomy and bilateral salpingo-oophorectomy was performed. The cervix, the body of the uterus and the tubes were found to be involved.

Case No. VI.—S., Hindu female, multipara, 24 years of age, suffered from amenorrhœa, rather profuse leucorrhœa, and occasional attacks of pain in the groin for 2 years. The cervix was hypertrophied and showed a bilateral tear.

It was soft and bled slightly on being touched. The uterus was somewhat fixed and there was some thickening on both sides. There was no evidence of tuberculosis in the lungs or elsewhere in the body.

Pathological examination of a wedge-shaped piece from the cervix provided the diagnosis. Sections showed characteristic tuberculous nodules with giant cells.

A description of these cases is published on account of the comparative rarity of the condition, and of the fact that an unusual series of them has been met with here during the last five years.

Interesting features are:—

(i) The fact that in none of the patients could any pulmonary involvement be detected on physical examination at the time, although Case No. V had had a hæmoptysis. Their subsequent histories could not be obtained.

(ii) In two of these cases the condition seemed primary in, and limited to, the cervix, Nos. III and IV.

(iii) The difficulty in deciding the diagnosis without resorting to the examination of microscopical preparations of the tissue.

I express my gratefulness to Colonel Leicester, F.R.C.P., I.M.S., Colonel Green-Armytage, F.R.C.P., I.M.S., and also to Major-Shanks, M.D., I.M.S., for giving me all possible facilities.

TICK-TYPHUS AND OTHER SPORADIC FEVERS OF THE TYPHUS GROUP.

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and

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DURING the past ten years there has been a steadily increasing interest in the typhus-like fevers which occur sporadically in many parts of the world. It is now evident that this disease group is of considerable importance, not only because of the frequency with which people are affected, but also because of the difficulties which arise in connection with the diagnosis, and the mystery which attaches to the mode of transmission in most cases.

Some of the outstanding features of several of the recorded fevers of the typhus group are given in the table inserted in this paper; from this it will be seen that there are certain points in which the outbreaks resemble each other, although there are some respects in which they differ from each other.

Typical temperature charts from some of the records are given; these will be of help to those who come across cases of such fevers.

The literature of the subject has become rather extensive and so it is considered useful to give a brief summary of the chief contributions to the subject.

Anticipating the logical sequence of the story, it may be pointed out that there are three definite diseases which belong to the main typhus fever group.

(1) Louse-borne typhus.

(2) Tick-borne typhus (Rocky Mountain spotted fever is the only form which has been thoroughly investigated), and

(3) Mite-borne typhus (Japanese river fever and pseudo-typhoid fever of Deli belong to this group).

There are many other records of typhus-like fevers, most of which deal with sporadic cases of unknown or doubtful vector.

It is necessary at the outset to emphasize the importance of a study of these diseases, Dr. E. W. Goodall in the *British Medical Journal* of 10th December, 1927, writes: "Attempts have been made to differentiate a new form of typhus as a new disease in various parts of the world (India, Australia, the Malay peninsula), and another reason has been urged for the distinction—namely,

that the infection is believed not to be conveyed by lice. But if the mode of spread is to be used as a criterion of distinction, then we had better call milk-borne scarlet fever 'Power's disease' and so on. 'Brill's disease,' and 'tropical typhus' are typhus fevers pure and simple; and it will only lead to confusion to continue the use of the newly applied names."

If we are to accept Dr. Goodall's drastic suggestion we might at once disqualify the Rocky Mountain fever and the Japanese river fever, for both of these diseases show very striking clinical resemblances to louse-borne typhus and nobody has yet proved that their virus is essentially different from that of typhus. But even if Dr. Goodall would not go so far as this, does he seriously suggest that it is unimportant to determine whether a fever of the typhus group is conveyed by lice or by ticks? The nature of the vector is so important in connection with diagnosis, management of the cases and prevention that the differentiation is not a mere academic question, but one of the first class practical importance.

Probably Dr. Goodall will support our contention that all the diseases which show the clinical picture of typhus should be classed in one group—the typhus-fever group—but it is to be hoped that he will not deter workers from attempting to classify the types of the disease in terms of the vector, as this is a very essential factor in the practical management of the diseases.

Brief Note on the Typhus-like Fevers of India.

In the *Indian Medical Gazette* of January 1917 the senior writer described an attack of typhus-like fever from which he suffered in June 1916. The probable vector was a tick which had remained in situ on the patient's body for about twelve hours. The tick had been encountered in the Kumaon Himalayas in a locality in which sporadic typhus-like fever was notoriously common, as had already been shown by Lt.-Col. McKechnie, I.M.S., (1) in 1913. Apart from the Rocky Mountain fever this was probably the first case in which a typhus-like fever was definitely attributed to a tick-bite, although McNaught (2) had incidentally mentioned that Col. Maher suspected ticks of being connected with a similar kind of fever in South Africa.

The publication of this paper resulted in further evidence being brought to notice of the occurrence of typhus-like fever under circumstances which suggested the tick as the vector, and in the *Indian Medical Gazette* of October 1921, a further note was written in which this evidence was given and a suggestion was made that "tick-borne typhus" might be found to be widely distributed in India and in other parts of the world, also

that it might prove to be similar to Rocky Mountain fever and like that disease be conveyed from a rodent reservoir.

Reasons were given in these two papers for believing that McNaught's "para-typhoid fevers" of South Africa, McKechnie's typhus of Bhim Tal and the "twelve days dengue group fever" described by Davies and Johnson(3) in Nigeria belonged to the same class.

At first the fever was regarded as being of the same type as Brill's disease, but further consideration led to the abandonment of this view as Brill's disease had come to be accepted as sporadic louse-borne typhus. It is evident that grave doubts are now being cast on the louse-borne view of the sporadic typhus of the United States, so that the relationship of the Indian fever with Brill's disease is not by any means disproved. In any case the name of a person is hardly an appropriate designation for such a fever, the important question being to assign the fever to its proper clinical and epidemiological group.

In 1924 Major Shettle gave Dr. Roy and the senior author(4) an opportunity of studying a group of nine cases of typhus-like fever which occurred in a military encampment in Saugor in Central India. The patients had not been in contact with each other, they had been camping in the open country in two widely separated encampments in which about 2,000 persons were living. The distribution of the cases was typically of the "chance" type, lice were excluded, the Weil-Felix reaction was completely negative in five and in only two was it positive in dilutions of 1 in 80. In these cases ticks were not actually found though the conditions of life were such that tick-bite was very likely to have occurred.

In another paper(5) in the same number of the *Indian Medical Gazette*, the senior writer discussed seven further cases which had been reported to him by various medical men in India: in three of these ticks had actually been found on the patients' bodies under circumstances which made it almost certain that there was a causal association between the tick-bites and the attacks of fever. Attempts to convey the disease by blood inoculation to guinea-pigs, white mice and monkeys were made in several cases with negative results.

Additional Reports of Typhus-like Fevers from Other Parts of the World.

In the *Medical Journal of Australia* of January 1922, Hone described 16 cases of a typhus-like fever occurring in Adelaide in which there was a mortality of 20 per cent. Lice could not be incriminated, but contact with a wheat flour weevil or a mite-like parasite of corn was suspected though no satisfactory evidence was produced. In later

accounts (*Medical Journal of Australia*, August 1927), Dr. Hone records 80 cases with 5 deaths; the Weil-Felix reaction is usually positive but the reaction may be only 1:100. The indol producing strains of *proteus* X 19 were used. Guinea-pigs were inoculated without any result. Rodents were suspected to be the reservoirs, but no evidence of the insect concerned could be discovered.

Dr. Wheatland deals with a "Fever Resembling Mild Typhus" in the *Medical Journal of Australia* of March 6th, 1926. The cases (38) occurred in the neighbourhood of Toowoomba in Queensland and many other cases are known to have occurred. The Weil-Felix reaction was positive in dilutions of 1:80 to 1:10,420. There was only one death which occurred in a woman 68 years of age. In no case were lice found, it was exceptional for more than one case to occur in a house. Out of 28 male patients 20 were farmers and on all their farms mice were very prevalent. Of the 10 female patients 9 came from farming districts and in all there was a history of mouse infestation. Guinea-pig inoculations were negative. An ecto-parasite of mice was suspected to be the carrier, and as ticks are not known to infest mice the vector would probably be a mite or a flea. Against mites is the complete absence of local sores. Fleas have never been known to convey a typhus-like fever but the possibility of flea transmission should be considered.

In the *Philippine Journal of Science* of September 1915, Schüffner describes a pseudo-typhoid fever in Deli in Sumatra. Schüffner suspected a tick or mite to be the vector; the disease is now regarded as being mite-borne by the *Trombicula deliensis*. In most of the cases there was a local ulcer and lymphangitis. In the *American Journal of Tropical Medicine* of November 1923, Maxcy and Havens(6) described 11 cases of typhus-like fever with positive Weil-Felix reactions in Alabama. The cases were sporadic, no lice could be found on the persons affected, the season of prevalence was the summer, autumn and early winter months, not the cold season.

In 1925, Dr. William Fletcher(7) of Kuala Lumpur described 18 cases of typhus-like fever; 5 were severe but none was fatal. There was no evidence of person-to-person infection. The persons attacked were chiefly Punjabi cattle-keepers or Europeans living in camp. Lice could be excluded in the cases of the Europeans. The Weil-Felix reactions were very interesting; all were positive, though some only in low dilutions, to a strain of *proteus* X 19 from the Lister Institute. Guinea-pig inoculations were all negative.

Dr. Fletcher has seen many cases of the same kind of fever since writing his first note on the subject. In one article he described 65

cases with 5 deaths. Serologically these cases fall into two distinct groups:—

1. Group K consist of cases which agglutinate the "Kingsbury" or non-indol producing strain of *proteus* X 19 and are negative to the indol producing strains such as the "Warsaw" and "No. 67" strains.

2. Group W cases are negative to the "Kingsbury" strain and positive to the indol producing strains.

There are certain epidemiological differences between the cases of the two groups, which suggest to Dr. Fletcher that the vector may be different. Dr. Fletcher suggests the name "tropical typhus" for these sporadic cases of typhus-like fever. In the *Report of the Institute for Medical Research of Kuala Lumpur* for 1926, Dr. Fletcher refers to some cases of tsutsugamushi or kedani fever which he has seen on the 15th day; in every case there was a characteristic primary ulcer and a bubo, the fever lasted from 20 to 26 days in the patients who survived.

Animal inoculations and the Weil-Felix reactions were negative, except that one patient showed agglutination to Wilson's *B. agglutinabilis* in dilutions of 1:120. *B. agglutinabilis* was also agglutinated with the serum from cases of tropical typhus of the W group, but was negative to those of the K group.

In 1925 Dr. Anderson(8) of the Kenya Colony described a very similar disease to which he gave the name "pseudo-" or "paratyphus." Cases occurred sporadically every year in the rainy season at a height of over 5,000 feet. Only one death was known to occur.

Early in 1927 Dr. Spencer(9) reported a case of typhus-like fever from Norfolk, Virginia. The fever started ten days after a bite from a tick which came from a calf hide. There was redness, swelling and a small ulcer at the site of the bite. The Weil-Felix was negative and so was guinea-pig inoculation.

The tick was not preserved but was believed to be *Amblyomma americanum*. Others who were bitten by ticks did not suffer.

In the *British Medical Journal* of the 3rd December, 1927, there is a report of cases of

"Brill's Disease" in and round Marseilles seen by Drs. Olmer, Boinet and Pier (*Bulletin de l'Academie de Medicine*, October 4th, 1927). The cases were nearly all sporadic. No lice were found and the Weil-Felix tests were negative. In most cases there was a small black scar suggesting an insect bite. There was congestion of the throat, sometimes with small ulcers of the mucosa. Meningism was common. Only one death occurred apparently in more than 50 cases.

Just before sending this to the press we have seen a further note on this disease by Burnet and Olmer in the *Archives de l'Institut Pasteur de Tunis*, Tome XVI, No. 4, of December, 1927 under the heading "La Maladie de Marseille." The question is raised whether it is mild typhus (Brill's Disease) or "tropical typhus."

The disease has been known in Marseilles and the Midi of France since 1922. A relationship with the "fevre boutonneuse" of Tunis was suggested by Nicolle.

The rash extends to the face, there is often pharyngitis, rarely conjunctivitis, there are local papules or scars associated with adenitis, suggestive of a bite by an insect.

The disease is common in the summer and autumn, not in winter; there is no evidence of person-to-person infection and lice have been excluded.

The Weil-Felix reaction was thoroughly tested against numerous strains of the *proteus* X 19 and was almost invariably negative. The strain used by Olmer gave negative results in 42 cases; this strain when tested against the serum of a case of typhus responded at once in a dilution of 1:500 and so was proved to be agglutinable. In three cases conflicting results were obtained using 8 strains: *one of these cases was negative to all on the 10th day; another was positive in dilutions of 1:125 or over to 5 strains and negative to 3 on the 20th day of convalescence; the third was positive to 7 out of 8 strains on the 3rd day of apyrexia.* All the other cases were negative. The following are the examples of the variations in agglutination response found by the authors:—

Subject.	Dilution.	Paris Strains.					Marseilles Strain.	Constantinople Strain.	Paris Strain.
		0 X19	H 2X	H X19	X19	Joh X19	Syria		
A On the 3rd day of apyrexia.	$\frac{1}{250}$	++	++	++	++	++	+	0	+++
B On the 20th day of convalescence.	$\frac{1}{250}$	+++	..	++	±	0	0	+++	+++
C On the 10th day of disease.	$\frac{1}{125}$	0	0	0	0	0	0	0	0

PLATE III.



Fig. 1.—Gunner K. 13th day of disease.



Fig. 2.—Gunner K. 13th day of disease.



Fig. 3.—Gunner K. 13th day of disease.

PLATE IV.



Fig. 4.—Gunner K. 13th day of disease.



Fig. 5.—Mr. C. 10th day of disease.
(Dr. Ghosh's case.)



Fig. 6.—Mr. C. 10th day of disease.
(Dr. Ghosh's case.)

The guinea-pig inoculation experiments were carried out with great thoroughness; sub-inoculations were made from brain tissue of the first series of guinea-pigs with negative results in both series. Guinea-pigs which had been inoculated from three febrile patients and showed no febrile reaction were tested later by inoculations with typhus virus and showed the typical febrile response.

The authors do not consider that the problem has been solved and ask for further investigation. They give useful hints as to methods which ought to be followed in experimental and epidemiological work on the subject.

In the *U. S. Public Health Report* for June 18th, 1926, Maxcy reported that 209 cases of endemic typhus had been diagnosed in Alabama with a mortality of 2 per cent. and a positive Weil-Felix in 93 per cent. The disease was regarded as typhus, but it was suspected that the louse was not the vector. In another report in December 1926 (*U. S. Public Health Report*, No. 52, Vol. 41, December 24th, 1926) Maxcy discussed the epidemiology of this disease and commented on the facts as follows:—

- (1) The distribution is scattered in place and time.
- (2) Males are attacked twice as frequently as females.
- (3) Negroes escape.
- (4) The incidence is much greater in the summer and autumn than in the winter and spring.
- (5) Persons engaged in food depôts, groceries, feed stores and restaurants are exposed to a distinctly increased risk of infection.
- (6) The disease attacked those who earned a reasonably good livelihood and seldom affected the unskilled labourers or unemployed.
- (7) The poor and uncleanly were not specially attacked, most of the victims were cleanly in their habits.
- (8) There was very rarely any history of association with an infected person; and multiple cases in the same household very rarely occurred.
- (9) The disease was not associated with louse infestation.

Maxcy raises the question whether there may not be a rodent reservoir and an arthropod vector other than the louse. Rats and mice are suspected as the reservoirs, fleas, mites and ticks as the vectors.

Further Observations on Indian Typhus-like Fevers.

The following cases and groups of cases have not been published hitherto, with the exception of a few which were reported in such a way that due credit was not given to the medical men who recorded them. We

are indebted to those who have so kindly forwarded reports of cases.

Cases Reported by RAO BAHADUR CAPTAIN P. KRISHNASWAMI, M.B., C.M., D.M.O., Krishna Dist. (Madras).

Dr. Krishnaswami has sent us an interesting record of 9 cases of typhus-like fever (Charts Nos. 1—9) which occurred among about 1,000 men of the Gurkha Rifles while marching through the hill jungles of Narsapatnam in the North-East of the Madras Presidency. The following is a summary of Dr. Krishnaswami's report. The cases obviously belonged to the typhus group but the Weil-Felix reaction was quite negative in five cases, and was positive up to a dilution of 1:100 in the only other case in which the test was made. The Widal reaction and blood cultures were negative in all the cases. One patient was strongly positive to the Wassermann test, another was moderately positive, the rest were negative. All these tests were carried out at the King Institute, Guindy, by Lt.-Col. J. Cunningham, I.M.S. There was no evidence of person-to-person conveyance of the disease. Lice were excluded, no ticks were found, but the conditions were such that tick-bite was very likely to occur. The rash was similar to that reported in other groups of sporadic typhus-like fever in India. In the earlier cases the rash was not noticed till the 9th or 10th day and there is no record of the order of its appearance on the different parts of the body. Little importance is attached to the failure to observe the rash during the earlier days of the fever in these cases, as the patients were dark skinned and the nature of their illness was not at first suspected.

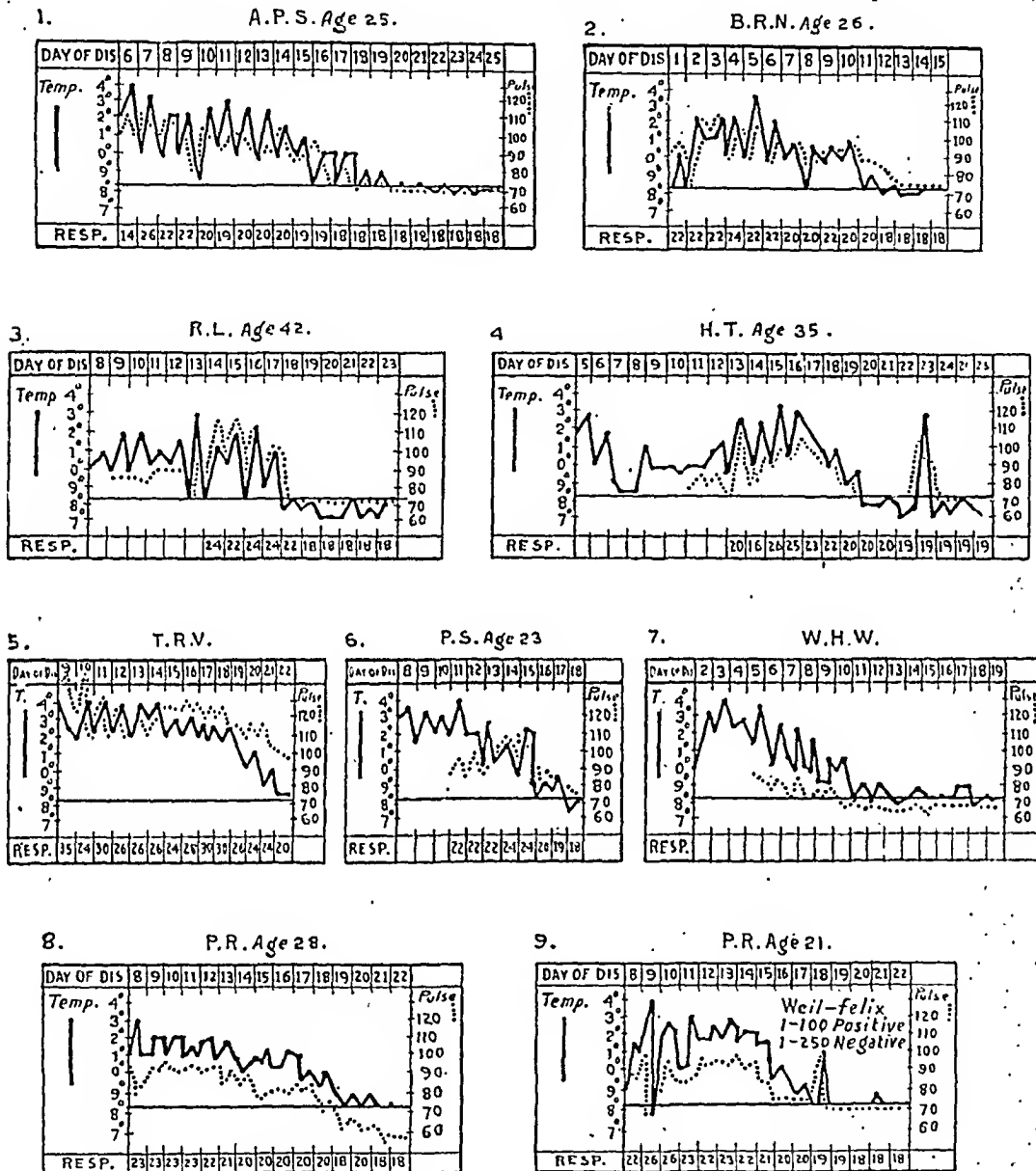
In the last three cases the rash was noticed on the 4th day in two and in the 6th day in one. In these patients the rash first appeared on the extremities and spread to the trunk. It was a discrete macular or papular rash which strongly suggested a syphilide in two of the cases. The note by Lt.-Col. J. Cunningham, I.M.S., and Dr. Theodore in the *Indian Medical Gazette* of October 1924 refers to these cases. The following extracts from this paper are of interest.

"The distribution of typhus fever in India is so imperfectly known that the occurrence of cases in a locality where the disease has not yet been previously recognised is worthy of record. Between the beginning of February and end of March this year 8 specimens of blood were received at the King Institute from the Medical Officer in charge of the Base Hospital, Narsapatnam, the base for the Futuri operations which have up till recently been carried on in the Agency Tracts of this Presidency. All of these specimens were negative to the usual examinations for malaria and fevers of the enteric group. The eighth case, however, gave a well marked Weil-Felix reaction, being positive in 1:100. This case was thus proved to be one of typhus fever. As no case of this type of fever has so far

as we are aware been previously reported in this Presidency, we requested Dr. Kesavaswamy to give us further information as to this particular case. His description of the symptoms together with the temperature chart which he kindly forwarded to us are typical and leave no doubt as to the correctness of the diagnosis. He also gives the following additional notes on the outbreak which are of interest.

to whether the disease has spread to the civilian population, but no cases have been reported from this source up to the present. It is of interest to note in this connection that the Agency Tracts where these cases have occurred have been free from relapsing fever so far as we are aware; whereas in the Nilgiri Hills where relapsing fever is raging at present no evidence of typhus fever has been obtained, although we have examined

Temperature and Pulse Charts of Typhus-like Fever Cases of Narsapatnam.



Before the Assam Rifles came to this Agency about the end of January 1924 this type of spotted fever was unknown in the Agency. Eight cases with exactly similar clinical pictures were admitted to this hospital between 12th February, 1924 and 29th February, 1924. The first case was that of a Sub-assistant Surgeon attached to the Assam Rifles. Of the nine cases (including the one under report) five were among the Assam Rifles, two among Sub-assistant Surgeons attached to the Assam Rifles, one (the present case), is an orderly attached to a Sub-assistant Surgeon (who was not attacked). In all cases the rash disappeared about the 25th day. Convalescence was established between the 15th and 18th day of the illness.

The disease was therefore obviously imported by the Assam Rifles from Assam. There is no information as

the sera of many cases of fever in whose blood no spirochaetes could be found at the time of examination.

* * * * *

It would appear that even in the hill tracts in this country relapsing fever and typhus fever do not occur in association with each other."

We do not accept Lt.-Col. Cunningham's suggestion that the disease was imported from Assam. It is more likely that the infection was one of the animals of the jungle through which the troops were marching, and therefore the absence of association with relapsing fever is not surprising.

Case Reported by DR. C. M. SCOTT, M.B.

A case was personally reported by Dr. C. M. Scott, M.D., of Rutlam, Central India (altitude 1,800 feet) in October 1924. The rash appeared on the 3rd or 4th day, first on the arms, then on the whole body including the palms, soles and even the scalp. At first the rash was macular, fading on pressure, staining persisted for several weeks. There was headache, sore throat, rigors and sweats. The fever was remittent, it started suddenly and lasted sixteen days ending by lysis. No lice or other insects were found and no other cases were known to occur in the locality. Dr. Scott was the patient himself.

Case Reported by LIEUT.-COL. T. E. FIELDING, R.A.M.C.

A case was personally reported by Lieut.-Col. Fielding. The patient was a European, aged 20, a gunner in the Royal Field Artillery lines in Secunderabad (altitude 1,830 feet). The date of onset was 21st November, 1924. The rash was noticed about the 3rd day on the chest and abdomen. It spread to the arms, legs, hands, feet and face. It was roseolar, macular, not definitely papular, and staining persisted at the sites of the spots for about 5 weeks. There was subacute conjunctivitis, headache and pains all over the body. The fever had a gradual onset, it lasted 15 days and ended by lysis.

The patient had been bitten about six days before the onset by "some insect" in the horse lines. There were no other cases in the locality. Blood culture was sterile.

Case reported by DR. C. E. S. NARMAN, F.R.F.P. & S., D.P.H., L.A.H., and DR. C. S. RAMCHANDRAN, M.B., B.S.

Dr. Norman and Dr. Ramchandran have reported a case in the *Indian Medical Gazette* of May 1925 in an elderly European in Trichinopoly on January 2nd, 1925 which appears to be of sporadic typhus-like fever. The eruption appeared about the third or fourth day, first on the legs then the abdomen and arms, finally on the forehead. There was vomiting, severe joint pains, suffusion of the eyes, slight leucocytosis. The spleen was enlarged. The fever lasted about 14 days. No history of tick-bite nor of association with any other person suffering from a similar disease was obtained.

Cases reported by LT.-COL. J. MCPHERSON, I.M.S., Residency Surgeon, Bangalore.

A European male, aged 58 (Chart No. 14), living in Bangalore (altitude 3,000 feet). The onset was on the 19th November, 1925. The type of the rash and the course of the fever were quite typical. Blood cultures (10th day) were sterile and the Widal (12th day) was negative. The patient was free from lice: he had been bitten by ticks 14 days previous to the onset while in camp.

Col. McPherson in an accompanying letter reports that he had seen two other cases in which he believes tick-bite to have been responsible, one was a European lady in Peshawar who had fever for 12 days with a maculo-papular eruption all over the body, and "pink eye." The Weil-Felix and Widal reaction were negative, no parasites were found. The patient had been bitten by ticks in Malakand shortly before the onset of the fever, one of the ticks had to be extracted forcibly.

The other patient was a European male (Mr. J. G. L., r.c.s.), in 1909-10 in Baghdad who had a spotty fever which he attributed to ticks which had bitten him when out shooting. The ticks were seen by Col. McPherson "like red pepper grains" and were recognised microscopically as ticks, but the species was not identified. In the above cases louse infestation would be exceedingly unlikely. Col. McPherson also reported a case in a young police officer who had a similar attack "like a mild typhus but not typhus clinically" (Col. McPherson has seen a number of cases of typhus in Peshawar). There was no history of tick-bite in this case.

Case reported by MAJOR C. S. P. HAMILTON, R.A.M.C., Jhansi.

A case was reported by Major Hamilton, R.A.M.C. The patient was Capt. A. E. C., a young European male (Chart No. 15), who was attacked on the 2nd January, 1927; he had been shooting for 13 days in the jungle near Mut-Kuli in the Central Provinces (altitude 3,500 feet), up till 4 days before the onset. The rash appeared on the 3rd day on the abdomen, spreading all over the body, it was profuse, maculo-papular and roseolar, staining persisted after the fall of temperature. There was headache, pains in the joints and all over the body. The course of the fever is seen in the chart. The Weil-Felix test on the 6th day was negative, the pulse was relatively slow and there was no obvious leucocytosis, the differential count on the 6th day being:—Polymorphonuclears 68 per cent., lymphocytes 30 per cent., large mononuclears 1 per cent., eosinophiles 1 per cent.

No lice or other insects were reported, but the conditions under which the patient had been living before the onset are strikingly similar to those of the case in which ticks were found.

Case reported by CAPT. N. M. P. DOTIVALA, I.M.S., M.O., I.S.H., Saugor.

Capt. Dotivala, I.M.S., reported a case which occurred in an Indian driver of the 15th Battery, R.F.A., in Dhana Camp near Saugor where several cases had occurred during the previous year (Chart No. 10). The date of onset was 17th January, 1925. The rash, course of the fever and symptoms are very similar to those of the cases reported in the *Indian Medical Gazette* of February 1925. The Weil-Felix reaction was negative, the total leucocyte count was 6,200 on the 12th day. Guinea-pigs were inoculated with blood on the 8th day of the illness, but the results were negative. Lice were found on his body. There was no evidence of association with any other case of the disease, but there was another case in a European gunner at the same time—see next report.

Case reported by LT.-COL. F. B. SHETTLE, I.M.S., S.M.O., Saugor.

Lieut.-Col. Shettle, I.M.S., who collaborated in the investigation of the previous series of cases in Saugor (*Indian Medical Gazette*, February 1925), reported another case in a European gunner of the 40th Battery, R.A., on the 18th January, 1925, at the same time as the above case (Chart No. 11).

This case was obviously of the same kind as the others already reported and so a detailed description is unnecessary. The locality was the same as in the previous case. Lice were found on his body but no association with other cases could be discovered. He had helped to carry a buck which had been shot in the jungle shortly before the onset so that he was obviously exposed to the bite of ticks or other arthropods of the jungle. The Weil-Felix was negative (day of disease not recorded). The Widal was + at 1 : 250 on the 4th day against the typhoid and para B organisms and ± at 1 : 150 against para A.

An organism was isolated which was at first regarded as a contamination, but later was reported as "para B." This is the only case out of a large number in which any evidence of typhoid group infection was found, although a very thorough investigation was made. The result must be regarded as unexplained.

Case reported by DR. D. N. ROY, and DR. S. SUNDAR RAO.

Gunner K., European male, aged 20, was attacked on the 30th January, 1926, in Dhana Camp near Saugor from which several other cases have previously been reported (Chart No. 12 and Plates I-IV). Details are unnecessary as the case was quite typical in every respect. No lice were found. No history of tick-bite

was obtained, but the conditions in the camp were such that bites by ticks or other arthropods of the wilds were likely. The Weil-Felix was negative. Two guinea-pigs were inoculated with no obvious result. Another case reported in the locality could not be investigated, but there was no association between the two; the second patient was a European lady who was attacked on December 25th. She was said to have nursed her dog which died of distemper.

Case reported by DR. S. SUNDAR RAO.

Lance Brigadier B., 40th Battery, European, aged 25 (Chart No. 13), was attacked in Chitora Camp near Saugor on the 26th January, 1927. He had been marching by road from Jabulpore to Saugor from the 11th till the 19th January and from the 19th till the 26th he had been in the camp. The case was quite typical and was the only one among 2,000 men who were in camp. No lice were found, and no association with any other case was detected. On the 9th day the Weil-Felix was negative; on the 16th day it was also negative; on the 21st day the following reaction was found:—

Strain 67 (Kuala-Lumpur) ..	+1 : 160	(This was the strain previously used in all the tests.)
Kasauli Strain ..	±1 : 80	

Kingsbury (Kuala-Lumpur) Strain ..	±1 : 40
Warsaw Strain ..	±1 : 40

This represents the highest agglutination found in any of the sera which were examined either at the Calcutta School of Tropical Medicine, the Haffkine Institute, Bombay, or the Enteric Convalescent Laboratory, Naini Tal. The lateness of the development of the agglutinins is notable; it will be necessary in future cases to test against various strains and up till a month from the onset.

Case reported by LT.-COL. M. R. C. McWATERS, I.M.S., Civil Surgeon, Naini Tal.

Lieut.-Col. McWatters in the *Indian Medical Gazette* of May 1927 in a paper in which by an unfortunate mistake was attributed to Dr. R. N. Bannerji described two cases of typhus-like fever, (a) one which occurred in a boarding school in Naini Tal. Clinically this resembled true typhus but no epidemiological data were available except that no lice were found. (b) A European male, aged 64, from Naukatchia Tal near Bhim Tal. This gentleman had lived for several years in the area which is believed to be endemic for tick-typhus, no lice were found, he was negative to the Weil-Felix test. He died on the 13th day of the illness. A possible clue to the source of infection was that the daughter of an Indian employee had "typhus" just before his illness which occurred in early September. It is probable but not certain that both of these patients belong to the group of typhus-like fevers conveyed by ticks.

In a personal communication in January 1927, Col. McWatters informed the senior author that the Medical Officer of Bhim Tal had seen numerous cases of typhus-like fever in Bhim Tal and Sat Tal in 1925 and 1926. Most of the patients lived near the lakes which are about 4,500 feet above sea-level: he reported that the infection sometimes appeared to spread from person to person in the affected houses. He also reported that ticks were uncommon, but we are able to assert that human beings are frequently bitten in this locality; both of us have been bitten by ticks in the neighbourhood, one of us twice although the stay in the place was a matter of hours only.

We have recorded exceptional cases in which several persons in the same house were attacked, and the possibility of the virus being capable of communication by lice as well as ticks was mooted (see *Indian Medical Gazette* of February 1924).

The distribution of the disease in Bhim Tal and Sat Tal is essentially sporadic, but every now and then

there is a house outbreak and the abundance of lice in the locality would greatly favour the occurrence of the exceptional house outbreaks if the virus were capable of conveyance by lice as well as ticks.

Case reported by MAJOR W. O. WALKER, I.M.S., Civil Surgeon, Darjeeling.

Mr. P. J. K., aged 42, was attacked in Darjeeling on the 15th June, 1927 (Chart No. 16). The rash appeared on the 5th day, first on the abdomen, then on the limbs and rest of the body including the face and palms. It persisted after the fall of the temperature. Cultures and the Widal reaction gave negative results.

The patient had been bitten by a tick 5 days before the onset while in Kalimpong (altitude 4,000 feet) in the Darjeeling district.

Case reported by CAPTAIN JAMES DOYLE, I.M.D., Civil Surgeon of Balaghat, Central Provinces.

A European official had been shooting in the jungle near Padrigunj Railway station (altitude about 2,000 feet). This place was about 150 miles from Jabulpore in the Central Provinces.

The date was during Christmas holidays, 1927-28 (presumably December 24th, 1927, till January 2nd, 1928). During this time he found two ticks fastened on his body. The onset of the fever was on the 3rd January, 1928. A few spots were seen on the 4th day of the disease, by the 7th day the spots were profuse and well marked over the body, arms and legs.

Lieut.-Col. Tarr, I.M.S., Civil Surgeon of Nagpur, was called in consultation on the 9th day of the disease and diagnosed "tick-typhus." The fever lasted 21 days (Chart No. 17). The patient was never seriously ill, he was depressed at times.

Malarial parasites were reported to have been found in the blood on the 2nd day and quinine bihydrochloride was given in doses of 20 grains daily, but apparently with no effect on the fever. If malaria really existed it is impossible that it could have been the cause of the fever.

The interesting points in connection with this case are:

(1) The association with a tick-bite about 7 days previous to the onset.

(2) The locality is the same as that in which two other cases occurred in which tick-bite was known to have occurred (Ref. *Indian Medical Gazette*, February 1925).

(3) The disease is now being recognised, as Lieut.-Col. Tarr apparently had no hesitation in making the diagnosis of tick-typhus. Captain Doyle adds that ticks are known to bite human beings in the jungle of Balaghat district during the winter season.

He reports that another European in the neighbouring Seoni district was infected under the same conditions in the previous year and that he has seen six cases altogether during his service.

A Case reported by DR. G. GHOSH, M.B., B.S., D.T.M., Lukergunj, Allahabad.

This report is in Dr. Ghosh's own words.

"Patient Mr. C. Anglo-Indian, male, aged 35 years, suddenly took ill on Monday afternoon, 5th September, 1927, when he returned from his office. He got fever and complained of terrible pains in the small of his back and legs. For a few days before his illness the patient felt languid with severe headache and pains in the legs. On Tuesday the temperature was about 101°F. On Wednesday the fever seemed higher and on Thursday it rose to 104°, and a rash appeared on his chest and back; he was sent into the European Civil Hospital, Allahabad, as a suspected case of small-pox, the same evening.

During the first few days of his illness the patient used to get repeated attacks of shivering and used to sweat profusely every 4 hours or so.

Condition of the patient on admission (8th September, 1927). General condition—faded, temperature about 105°F. or comatose, complained of severe headache and pain all over the body. His eyes were red and congested.

Alimentary System:—

Tongue—slightly coated.

Bowels—constipated; no tympanites.

Polymorphs	..	..	54%
Lymphocytes	..	..	42%
Large mononuclears	..	..	3%
Eosinophiles	..	..	1%

(c) Total white blood cell count—

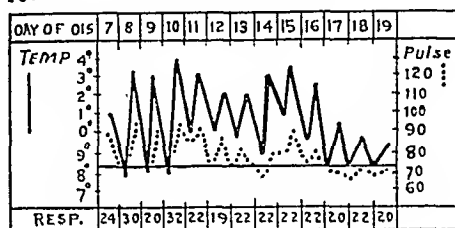
11,600 per c.mm.

(d) Widal reaction serum agglutinating *B. typhosus* in dilution of 1 : 80. Negative against *B. paratyphosus* A and B.

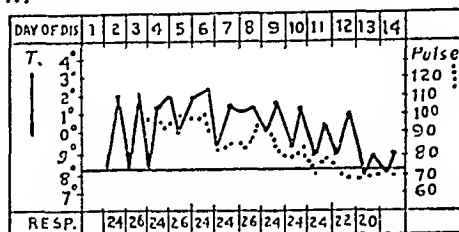
(e) Weil-Felix reaction. Blood taken on 14th

Temperature and Pulse Charts of Typhus-like Fever Cases.

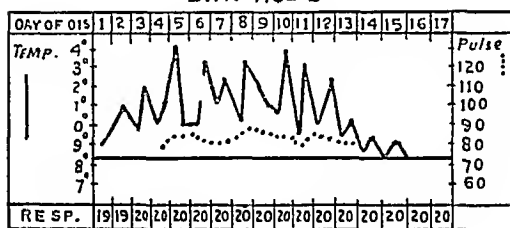
10. S.S. AGE 23



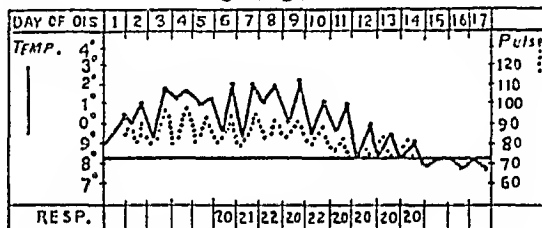
11. G.R.P. AGE 22.



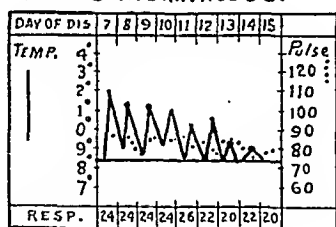
12. B.K. AGE 20.



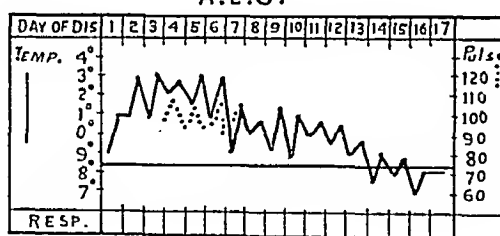
13. G.W.B. AGE 25.



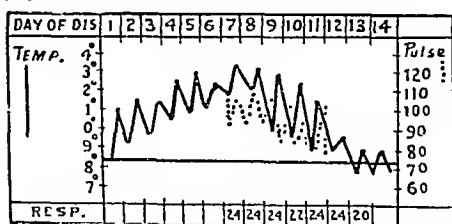
14. C.W.G.M. AGE 58.



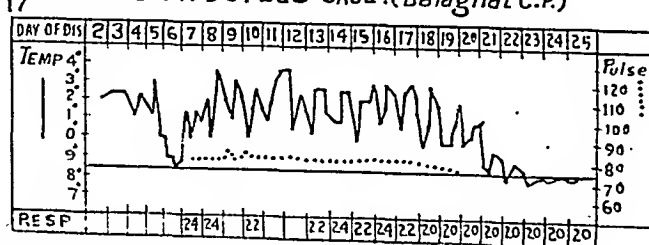
15. A.E.G.



16. P.J.K. AGE 42.



17. CAPT. DOYLE'S CASE. (Balaghat C.P.)



Localities—10-11-12-13, Saugor C. P.; 14, Bangalore; 15, Mut-Kuli: Pachmarhi;

16, Kalimpong: Darjeeling.

17, Balaghat, C. P.

Spleen and liver—not palpable.

Slight pharyngitis present.

Respiratory system—no signs of bronchitis.

Circulatory system—nothing abnormal.

Blood Examinations:—

(a) No malarial parasites found.

(b) Differential count—

September, 1927, and 28th September, 1927, and sent to Kasauli for this test. Report negative. (+ 1 : 10 ± 1 : 20 against *B. proteus* X 19 indolgenic strain; ± 1 : 10 against *B. proteus* X 19 non-indolgenic strain.)

Urine Examination:—

Colour—dark brown.

Sp. gravity—1,012.

Reaction—acid.

Albumen—nil.

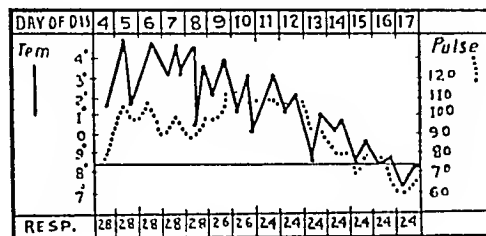
Sugar—nil.

Nervous system.—The patient seemed to be nervous. He complained of severe headache and pains all over the body. He could not sleep for a few nights on account of pain. He was complaining of extreme weakness.

The course of the fever is shown by the chart (Chart No. 18).

18.

Mr. C. Age 35.



18. Allahabad.

Rash.—The rash appeared on the 4th day of the disease on the chest and back at first and then gradually appeared on the abdomen, extremities and forehead. The spots were like red papules at first, fading on pressure during the first two days. Afterwards they became dull red in colour and did not fade on pressure (Plate Nos. V and VI). Some of them became distinctly petechial in character. About the 12th day of the disease, they became brownish red in colour and some of them began to disappear. Most of the rash on the arms and forehead had disappeared, but those petechial spots were as big as 3/4th inch in diameter.

The patient left the hospital on 1st October, 1927. He was seen on the 10th October, 1927, i.e., 20 days after the temperature had come down to normal. Marks of rash on the arms and forehead had disappeared but those on the legs and feet were still visible but were fading.

A few other points about the case:—

(1) The patient gives a history of having inoculation of T.A.B. vaccine.

(2) No ticks or lice were found on his person when he was in the hospital.

(3) On being questioned, he gave a history of being bitten by an insect about 10 days before the onset of fever. He went out shooting and also fishing in the jungle of Meja Road—a place about 15 miles from Allahabad and it was there that he was bitten by an insect on the nape of his neck. He mentioned to his wife about the bite. The bite was rather painful but he forgot all about it afterwards. No mark at the site of the bite could be detected when he was in the hospital, i.e., about 15 days after he was bitten."

Note by DR. S. SUNDAR RAO, on an Investigation of Fevers in Bhim Tal and Sat Tal in 1925.

I visited Bhim Tal, Sat Tal and the adjoining villages of Dhungisilla, Pande and Bhag-tora in the Kumaon Hills (elevation 4,500 ft.) during the months July to October and during my investigations there I collected the histories of 43 cases of fever which were probably cases of typhus-like fever. But as no thorough examination of all these cases was made, it could not be asserted that all of them were really cases of typhus-like fever. The cases were mostly sporadic in occurrence. Out of the 43 cases mentioned above, the blood was examined for parasites and a differential leucocyte count made in 15 and a full

examination was made of 8 cases. Animal inoculations were also carried out with negative results. Of the 8 cases which were investigated, it was found that there was a definite infection with typhoid in two cases, with paratyphoid "A" in one, and typical typhus-like fever in another (positive Weil-Felix 1 : 80); the remaining 4 cases are possibly cases of typhus-like fever. This shows that there is a likelihood of other fevers being mistaken for typhus-like fever (which certainly occurs in this area), as infection with typhoid, paratyphoid, and malaria are quite common in this area during this season.

That typhus-like fever is common here is well known. I quote from a letter I received from Dr. Gajendra Thapa, L.M.P., Medical Officer-in-charge, Bhim Tal Dispensary "I heard that one of my predecessors died of typhoid fever, but I think he had typhus (Bhim Tal fever). This year we had 11 cases of this (Bhim Tal fever) and of these only 2 patients gave a history of tick-bite within 21 days of getting fever."

I may mention here that it is not always that people are aware of the presence of a tick that has attached itself to them, especially as it attaches itself so unnoticeably and without causing the least feeling of pain or discomfort, even when it buries itself in the host's body. The following instance may be of interest in this connection. A geologist friend of mine who returned from the Assam jungles after a stay of a few days had got on him two ticks, which he had not noticed for over 17 days in spite of the fact that he was having his daily bath. When this can happen to a scientist it is not surprising that most of typical tick-typhus cases give no history of tick-bite if we rely only on the evidence given by the patients.

Localities in which typhus-like fever has been found to follow tick-bite.

The following are the areas in which a typhus-like fever has been observed to occur within a few days of the bite of a tick.

1. The Rocky Mountain fever—In the case of this disease a tick has been proved to be the vector.

2. Indian cases.

(a) Near Sat Tal in the Kumaon Himalayas one case.

(b) Naraingunj in Eastern Bengal—one case.

(c) Balaghat in the Central Provinces. There were three definite cases from this locality.

(d) Bangalore. One case.

(e) Malakand. One case.

(f) Kalimpong near Darjeeling. One case.

3. Mesopotamia—A case in Baghdad.

All the cases from India and Mesopotamia have been described in the papers by the senior writer.

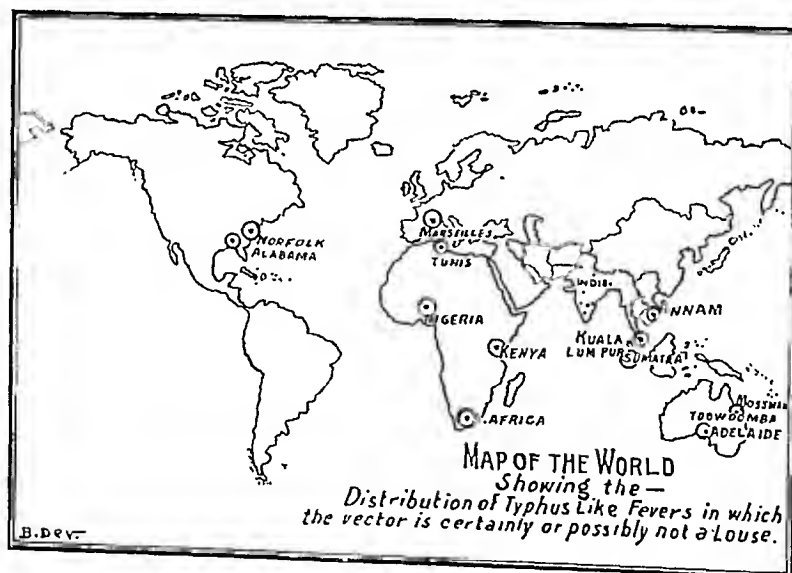
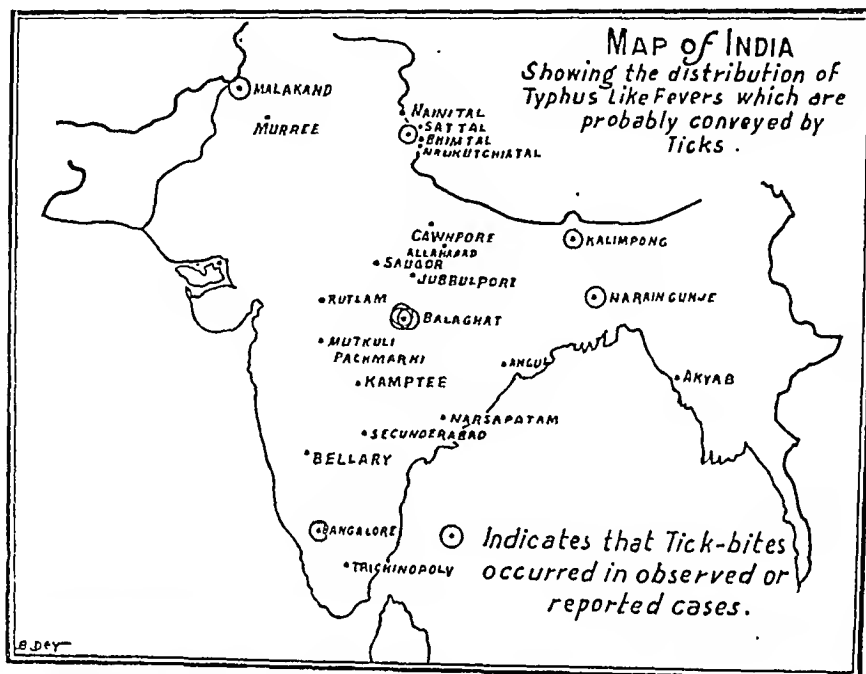
4. Norfolk—Virginia—The case described by Dr. R. R. Spencer in 1927.

In addition to these there are many other cases in which there is a strong suggestion that ticks had bitten the patients, but in these the association with tick-bite has not been proved to occur.

of person-to-person infectivity such as would be expected to occur in a louse-borne disease. Actual evidence of the arthropod vector is surprisingly scanty, apart from the cases reported by the senior author from India and Spencer's case from Norfolk, Virginia.

The Weil-Felix reaction in Typhus-like fevers.

The great variations in the Weil-Felix reaction are remarkable. Fletcher's interesting



These examples of sporadic typhus-like fever from India and other parts of the world show that a fever of the typhus-group occurs quite commonly in many places under conditions which are entirely dissimilar to those which are usually associated with louse-borne typhus. The common features of the disease are low mortality, failure to infect guinea-pigs, and a total absence of evidence

observations show that all of his cases gave a negative response to one or other of the strains of *B. proteus* X 19, and also that all of the cases were positive to some of the strains used, so that if only one strain of the organism had been employed the results would have been bewildering.

The paper by Wilson of Belfast in the *Journal of Hygiene* of July 1927 is of

special interest in connection with the serology of the fevers of the typhus group. Wilson was the originator of the agglutination test for typhus fever and therefore his findings are of exceptional importance.

He found great variations in the response of various strains of *proteus* X 19 to serum from European cases of typhus; some of the strains gave the reaction in high dilutions to some samples of serum, while others gave the reaction in low dilutions and the results were by no means consistent with each other.

On the whole the "Kingsbury" strain received from Dr. Fletcher was very insensitive to serum from European cases of typhus, and Wilson's original *agglutinabilis* strain of bacteria was more sensitive than *B. proteus* X 19. The following are two examples of the variations in agglutination response found by Wilson:—

Strain	Jerusalem	Strain	Warsaw
"0."	Strain.	67.	Strain.
Serum 1	+++1 : 80	-1 : 40	++ +1 : 160
Serum 2	++1 : 320	++1 : 80	++ +1 : 640
			++ +1 : 320

The conflicting results obtained by Burnet and Olmer, have already been described. The evidence all points to such a variability in the agglutination response that it seems doubtful whether much importance can be attached to the Weil-Felix test for the classification of the typhus-like fevers, until some order can be evolved from the state of confusion which exists at present. The failure to infect guinea-pigs and other animals would suggest that the fevers do not belong to the typhus group at all, at any rate to the ordinary louse or tick-borne forms of the disease, but the clinical evidence is so overwhelming that these failures cannot be accepted as proof that the diseases belong to another group. The failure to produce symptoms of tsutsugamushi disease in inoculated field mice, although the inoculated mice can be proved to be infective, may have some bearing on this question, and obviously further study is needed before we can form a true estimate of the significance of animal experiments in cases of fevers of the typhus group.

Laboratory findings have hitherto been regarded as offering absolute criteria by which we can determine the nature of typhus and allied fevers; it is now evident that these supply conflicting evidence.

It is obvious that sporadic cases of typhus-like fever occur in many widely separated places in the world, and while some of these may be explained as sporadic louse-borne typhus, it is exceedingly unlikely that the louse is the vector of all or even of majority of the cases,

The Part Played by the Tick.—The spotted fever of the Rocky Mountains has been proved to be conveyed by the tick, and although this disease is very closely related to louse-borne typhus in clinical manifestations and pathology we are fully justified in classifying it as a distinct type of fever and in calling it "tick-typhus."

A definite association with the bite of a tick has been shown to occur in eight of the Indian cases of sporadic typhus-like fever; nearly all of the other cases have occurred under conditions in which louse conveyance could be excluded and tick-bite was very likely to occur. One point which has to be determined is whether ticks can attach themselves to the body for a sufficient length of time to introduce infection and then drop off without having been observed.

This hypothesis does not seem to be inherently improbable: a tick-bite is usually painless, man is not the host of choice of ticks and so it is quite possible that the tick may feed on man only when a more congenial host is not available; and it may find the smooth human skin unsuitable for a prolonged stay. In several of the cases in which ticks were found in situ after the fever had appeared they were situated in such protected places as the umbilicus, the scrotal skin, and the external auditory meatus. It is quite possible that disturbance by friction of the clothing may cause the dislodgment of ticks which happen to bite other parts of the body.

A point which suggests that undetected tick-bite may frequently occur is that we have often been told that ticks never bite human beings in certain localities, yet we have soon found from personal experience that they do so. Ticks had not been suspected of conveying disease to human beings except in some well defined areas in which Rocky Mountain fever, tick relapsing fever and tick paralysis are known to occur, hence medical men seldom enquire into the question of tick-bite, the layman also does not look for ticks and so they are very likely not to find them unless they obtrude themselves on their attention.

Taking into consideration the known facts that the tick conveys a typhus-like fever known as Rocky Mountain fever, and that not less than eight cases of a similar disease have been seen in which the onset of the fever occurred in India within a few days of bite by a tick, it is reasonably certain that the tick can convey a typhus-like fever in India. This disease may be identical with the Rocky Mountain fever, at any rate it is closely related to that disease.

The name tick-typhus is more appropriate to the fevers of the typhus-group which are known to be conveyed by ticks than the

other names which have been suggested such as Rocky Mountain fever.

The other cases of sporadic typhus-like fever in India which resemble tick-typhus in their clinical and epidemiological features are likely to be conveyed by ticks, as the only other probable vector—the mite—causes a local sore and lymphadenitis in the great majority of cases; the type of locality affected is different, and no evidence of mite infestation has been discovered in the Indian cases.

A mite or other arthropod may well be found to convey a typhus-like fever in India, but unless the mite-typhus of India differs greatly in its symptomatology from the cases seen in other parts of the world it is unlikely that mites are responsible for the Indian cases which have been recorded.

In the cases of sporadic typhus-like fever which have been reported from other parts of the world the evidence for tick transmission is much less definite.

Apart from the classical Rocky Mountain fever there is only one case recorded outside India in which typhus-like fever followed a bite by a tick, viz. the case from Norfolk in Virginia, reported by Spencer in 1927.(10)

In the typhus-like fevers described by McNaught as "paratyphoid," ticks were suspected by Col. Maher to have some connection with the disease so that presumably ticks were known to have bitten some of the patients. Of the other recorded cases all that can be said is that they occurred under conditions in which tick-bite was more likely to occur than the bite of any other arthropod, lice and mites included.

The cases reported by Maxcy in Alabama and Savannah(11) would at first sight appear to contradict this suggestion because they occurred in persons living in large centres of population. It would be interesting to discover how many of the patients had been in the habit of spending their Sundays and holidays in the woods and open country. People of the social stratum which was chiefly affected would be likely to go into the wilds by the automobile which is universal in America to-day.

We know where the patients lived and worked, but we are told nothing about where they spent their Sundays and other holidays. Maxcy has excluded lice, he suggests ticks, mites and fleas as being worth considering, and while we agree with him generally, we are inclined to regard ticks as the most likely of the three vectors which are mentioned.

The Marseilles group of typhus-like fevers(12) is of interest; it is a curious fact that a few days before reading the report of this disease in the French lay press, the senior writer came across a case of tick-bite in a human being in the South-West of France at about the same latitude as Marseilles.

The relationship between Louse-typhus, Tick-typhus and Mite-typhus.

Till recently there was very little tendency to emphasize the relationship between typhus, Rocky Mountain fever and Japanese river fever: the work of Ricketts and Wolbach has demonstrated that the pathology of the former two diseases is so similar that there can be no reasonable objection in classing them as members of one disease group. Recent work on the Japanese fever suggests that it is of the same type, and therefore the senior author felt justified in suggesting that all the typhus-like fevers should be united in one "typhus group" and that the members of the group should be called louse-typhus, tick-typhus, mite-typhus and typhus of unknown vector. Criticism was anticipated from those who have described the three diseases as distinct entities, but it was surprising to find that Dr. E. W. Goodall now attacks those who would differentiate the members of the typhus group of fevers. Dr. Goodall contends that the fevers are typhus, whatever the arthropod vectors may be. Classification should always serve a useful purpose and if the diagnosis and prevention of all the fevers of the typhus group were on the same general lines there would be no object in subdividing the group. But we can hardly imagine two diseases which are more dissimilar in respect of the conditions under which they are conveyed than louse-typhus and tick-typhus: correspondingly the methods of management of the patients are quite different and so are the measures of prevention. Also it is probable that there are specific differences in the virus of the two diseases. In any case it would appear to be reasonable to apply the name of the vector when this is known, while in cases of doubt the disease can be called a "typhus group fever."

Ancestry of the Rickettsia Bodies.

In a previous paper (*Indian Medical Gazette*, February 1924) the suggestion was made by the senior writer that the virus of tick-typhus and that of louse-typhus might have a common ancestry and that either virus might exceptionally be conveyed by both arthropod vectors instead of solely by one.

In the case of sporadic typhus-like fevers there is rarely any evidence that person-to-person communication occurs, but there was one "household" outbreak in the series reported by Lt.-Col. McKechnie which could be explained more readily by the hypothesis of louse-infection than by that of infection by ticks of the forest.

The experiments of Nicolle and Anderson (13 and 14) on Spanish relapsing fever are suggestive in this connection; these workers found that the infection which was normally tick-conveyed could also be communicated

by louse-infection. If such an occurrence takes place in connection with fevers of the typhus group, it must be rare, as it is extremely unusual for two cases of sporadic typhus-like fever to occur in persons who have been in contact with each other; the rare occurrences of this kind may usually be explained by coincidence or by the existence of specially intense endemic conditions.

SUMMARY AND CONCLUSIONS.

There are certain fevers whose clinical manifestations and pathology point to their belonging to the same group, the "typhus group of fevers."

One of these which is called typhus or typhus exanthematicus is known to be conveyed by lice, and therefore it may be called louse-typhus. Another—the Rocky Mountain fever—may be called tick-typhus, and the third—tsutsuganushi disease—can appropriately be called mite-typhus. There are other examples of tick-borne and mite-borne typhus to which the names Rocky Mountain fever and Japanese river fever are obviously inapplicable, hence the necessity for devising names of universal applicability.

There are many places in which sporadic typhus-like fever of unknown vector occurs: in the present state of our knowledge it is most suitable to designate these as "typhus-group fevers."

Most of these cases occur under conditions which suggest that an arthropod of the wilds conveys the infection from a rodent reservoir, and therefore it is desirable that they should be investigated with special reference to ticks, mites and other possible arthropods.

So far as India is concerned all the available evidence points rather strongly to a tick as the vector, but it is desirable that further study of all the available evidence should be made and that medical men should investigate all cases of typhus-like fever with special reference to the vector concerned. When a tick is found in situ in a patient suffering from fever it ought to be sent to the Calcutta School of Tropical Medicine, alive if possible, otherwise preserved in 70 per cent. alcohol. It is desirable that all ticks which are found biting human beings should be preserved and identified.

The possibility of a typhus virus being conveyed by two alternative arthropods, especially the louse and the tick ought to be further investigated.

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SEVENTEEN CASES OF SCARLET FEVER.*

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IN marked contrast to measles, "which is common all over the tropical East and especially in India" (Rogers), the occurrence of scarlet fever in India should excite some clinical interest.

This is the necessity for recording these notes of seventeen cases occurring in a large boarding school.

A limited epidemic of scarlet fever occurred in this School in the months of October, November and December of 1927.

The total number of cases observed during this period was seventeen, all from the Boys' School, the ages ranging from 7½ years to 17½. The disease was ushered in with the usual clinical symptoms of vomiting, sore throat and fever, followed by a rash in 24 hours. Only one case, the first to occur, gave a definite history of vomiting, indeed it was for this symptom alone that he was sent to hospital. (It is interesting to note here that vomiting in children should always excite a suspicion of the possibility of one of the exanthemata. This boy, for this symptom alone, was isolated and was found next morning to have a rash.)

All the patients complained of sore throat and examination revealed either patches on the tonsils or a dusky redness of the tonsils and pharynx.

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Every case had pyrexia of varying intensity.

The mildest case was 100° and a few reached 104°.

The distribution of the rash was chiefly on the trunk, at first being confined to the chest.

In mild cases the rash was extremely faint but gave a definite punctate sense to the touch.

Filatow's sign of circumoral pallor was typically seen in two cases. In one case the distribution of the rash was peculiar, being only visible and very intense in the axilla, subcostal area and the abdomino-femoral triangle on both sides of the body.

As commonly described, the duration of the rash in different cases varied, from a fleeting rash lasting only a few hours, to one lasting a week.

Palpable occipital glands and submaxillary glands were felt in all, except two cases who were not detected in the early stages and were admitted to hospital later on account of scaling of the trunk of hands.

The typical scarletinal tongue resembling "strawberries and cream" was satisfactorily observed in only one case, while another in the second week showed a typical "raspberry" tongue.

A degree of desquamation ranging from a fine powdering to large flakes of epidermis was constantly found in every case.

Under a hand lens, this scaling differed from the scaly appearance often found on the skin of children, (not naturally addicted to the excessive use of soap and water) in that it was in the form of small rings and was present even after a thorough wash.

In two boys the rash and sore throat were so transient as to have escaped notice entirely, and they were admitted to hospital later for desquamation and a temperature.

All these seventeen cases were classified as simple scarlet fever (*scarletina simplex*) as in none of them were the symptoms unduly aggravated.

Indeed, the epidemic was of a mild nature, and only one case presented the typical textbook appearance and course of scarlet fever.

Four of the seventeen boys developed *nephritis*. They were all four mild cases who had not been detected in the early stage and had escaped hospital treatment.

The first of these boys was admitted with desquamation on the trunk.

Two days later he developed mild uræmic symptoms, viz., headache, vomiting and twitching of the muscles of the face and limbs.

The urine was reduced in quantity, of high specific gravity (1020), with a pink tinge and contained albumen.

The second boy had a mild form of the disease, but a puffy appearance under the

eyes during convalescence directed attention to the urine which was found to be acid, specific gravity 1028, and to contain albumen.

The third boy presented signs similar to the second boy. The fourth boy had only a trace of albumen for three days. This was discovered during the daily urine tests.

In none of these cases did the albuminometer register more than one part of albumen in a thousand.

In testing the urine for albumen, attention to one point is essential. The urine must be filtered to render it quite clear. The cloudy ring with cold nitric acid is then very distinct. In scarlet fever (as in all pyrexial states) the urine is invariably turbid, and the turbidity must be got rid of by filtering or some other method.

Otherwise, a hazy appearance on boiling or on the addition of the urine to cold nitric acid is apt to lead to the erroneous conclusion that a trace of albumen is present.

The patient may, consequently, be confined to bed and a restricted diet, longer than is necessary.

(Testing for albumen with a solution of salicyl-sulphonic acid is said to be a more delicate test. It did not appear to be so with the cases in which it was used.)

Three boys developed a *secondary adenitis of the submaxillary glands* during the third week. This did not go on to suppuration. No case of *otitis* occurred.

One boy, at the end of the first week had *herpes on the lips* and a *small patch of solid lung* at the right base which very rapidly resolved.

The diagnosis of mild and atypical cases of the exanthemata can be extraordinarily difficult, especially the first few cases met with, and the only way to avoid the pitfalls is to bear them all in mind.

Toxic erythema due to intestinal absorption, common in children, is not accompanied by fever or pharyngeal congestion.

In erythema scarlatiniforme there is little or no constitutional disturbance, and sore throat and enlarged submaxillary glands are not found. There is also an absence of eosinophilia.

The catarrhal signs in measles and rubella are usually distinct, and Koplik's spots may be present in the former disease.

A scarlatiniform rash occasionally occurs with acute tonsillitis, but does not go on to desquamation.

Confusion with diphtheria should be avoided, as in all severe tonsillar inflammations one is usually tempted to examine or send to a laboratory a swab from the throat.

The "fourth disease," described by Filatow and Dukes, and said to resemble a mild course of scarlet fever, probably does not exist.

(In looking up previous records of the occurrence of scarlet fever or any of the

exanthemata resembling scarlet fever in this School, I find that several cases have been recorded during a short period in 1919 as the "fourth disease.")

In doubtful epidemics the later occurrence of nephritis in some of the cases of course confirms any pre-existing suspicions.

The Dick test for scarlet fever can always be done, as it is as well established as the Schick test in diphtheria.

These series of seventeen cases confirms several known facts regarding scarlet fever in India.

Its rare occurrence in epidemic form has been noted, although I believe that sporadic cases do occur.

It would be interesting to know if nephritis in children in India, in the large cities, is uncommon, and whether it is traceable to mild scarlet fever.

In this series only three of the boys of the seventeen affected were of mixed parentage and all three were missed in the stage when the rash, however slight, must have been present.

Has scarlet fever any selective action on race?

In South Africa the natives practically never get it.

The disease amongst the Europeans is milder and invariably occurs in the cold weather. This statement might equally well apply to this country.

Scarlet fever when it occurs in this country is usually of a mild nature and shows no tendency to spread rapidly.

In this epidemic only seventeen cases occurred in a school of over five hundred children.

Of course, precautions to control the spread of the disease to the Girls' School and Preparatory School were in force, but I have never met with other outbreaks of infectious disease in this School, which in spite of similar rigid precautions were so easily controlled. One of the methods of control employed was a subcutaneous injection of Concentrated Scarlet Fever Antitoxin (B. W. & Co.) to contacts. Thirty-seven were thus inoculated, including members of the hospital staff attending the isolation ward. Doses of 3 c.c. to 5 c.c., depending on the age, were given.

The passive immunity conferred is not very long, perhaps up to a fortnight. None of those inoculated developed scarlet fever, but this does not prove that any real immunity was conferred.

Swabs from the throat of several of the cases were examined and a non-hæmolytic streptococcus was isolated.

Dick 'positive and negative reactors' were not sought for amongst the children, as the Dick reagents, owing to climatic reasons, are not available in India.

In the four cases in which albumen occurred the onset was preceded by a day or two of fever. Since the re-opening of School thirteen of these boys have returned after two months' holiday and tests have shown them all to be free from albuminuria.

The treatment in scarlet fever does not call for any special remarks. In septic cases or where there is an anginoid condition of the throat the specific antitoxin should be given. In this series the antitoxin was available but its use was never indicated. Scarlet fever in this country then is seemingly so mild, that, even in the event of albuminuria supervening, there should be little hesitation in giving a good prognosis.

The laity are inclined to regard scarlet fever occurring in India as a grave disease, and its appearance in a school is likely to cause great apprehension to both parents and teachers.

School medical officers should be quick, therefore, to allay this anxiety, as in view of present knowledge, they can safely predict the mild course of the outbreak and in the event of unusually severe clinical symptoms have recourse to the specific antitoxin. The source of the infection could not be determined.

The possibility of the infection by milk was excluded, as no cases occurred in the Girls' School or the Preparatory School and all three schools have a common milk supply from the School Dairy.

THE WIDAL AGGLUTINATION REACTION IN HEALTHY PERSONS.

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and

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VARIOUS authors have referred to the relative immunity of the inhabitants of the tropics to the typho-coli group of organisms. This immunity, it has been argued, is due to infection in childhood or to repeated small inoculations with infected food and drinks at an early period of life. Many observations have been made on the persistence of agglutinins that develop in the blood after protective inoculations. According to Wade McDaniel 11.7 per cent. of cases give a positive Widal reaction after one year from the inoculation. But no Indian data are available regarding the presence of agglutinins in healthy individuals, or regarding the persistence of the agglutinins in the blood after an attack of enteric fever or dysentery.

Infections from the organisms of this group are quite common in Bihar. Both sexes and all ages are affected. It was of interest, therefore, to study the agglutinating property of the blood in apparently healthy Indians who had not been protected previously, especially in an area where the infections from the typho-coli group of organisms are so prevalent.

We selected 100 apparently healthy individuals from different classes, viz., 12 of them from the medical students who live in the college hostel in A, 42 from the professional class of people who live under ordinary sanitary conditions in B, and 46 from the poorer classes who usually work as servants and day labourers and live under questionable hygienic surroundings in C.

Dreyer's technique with Oxford standard agglutinable culture was employed for these tests. The standard technique does not give the serum reaction in dilutions 1:12.5 and 1:83, and for these titres we improvised a simple method; for the former the serum was diluted to 1:5 instead of 1:10 and 10 drops of it were put up with 15 drops of standard agglutinable culture; for the latter 3 drops of serum diluted to 1:10 were put up with 7 drops of saline and 15 drops of the standard culture added.

three between 2 and 3 units; of 3 cases with *Paratyphosus B* agglutinins one had between 4 and 5 and two between 2 and 3 units.

Reference to Table II shows that all cases with positive agglutinins, except one belonging to group B, occurred in the individuals of group C who usually live under unsatisfactory hygienic conditions.

We shall take up in our next paper the subject of the persistence of agglutinins in persons after a definite previous infection from one of the organisms of the typho-coli group.

CONCLUSIONS.

1. Healthy individuals belonging to the middle class in Bihar do not as a rule show any agglutinins of the typho-coli group.

2. The few individuals who do show their presence belong to the poorer classes who live under unsatisfactory hygienic conditions.

3. There is a remarkable absence of *B. dysenteriae* (Shiga and Flexner) agglutinins in all.

4. The comparative immunity to typho-coli organisms in persons living in tropical countries, referred to by so many observers, does not appear to be due to the presence of

TABLE I.
Agglutination Reaction expressed in Serum Dilutions.

Organism.	Negative.	+ $\frac{1}{12.5}$	+ $\frac{1}{25}$	+ $\frac{1}{50}$	+ $\frac{1}{83}$	+ $\frac{1}{125}$	Total.
<i>B. typhosus</i>	94	2	3	0	0	1	100
<i>B. paratyphosus A</i>	96	3	1	0	0	0	100
<i>B. Paratyphosus B</i>	97	2	1	0	0	0	100
<i>B. dysenteriae</i> , Shiga	100	0	0	0	0	0	100
<i>B. dysenteriae</i> , Flexner	100	0	0	0	0	0	100

Reference to Table I shows that 6 per cent. of apparently healthy individuals had *B. typhosus* agglutinins, 4 per cent. had *B. paratyphosus A* agglutinins, and 3 per cent. had *B. paratyphosus B* agglutinins; whereas none had *B. dysenteriae* agglutinins (Shiga and Flexner). It is remarkable to note that 35 per cent. of Col. Megaw's control cases gave a positive reaction to Flexner organisms in dilutions of 1:40 and over, and 5 per cent. to Shiga organisms in dilution of 1:40.

Of 6 cases with typhoid agglutinins only 1 case, who gave a history of continuous fever for 30 days three months before, had 23 units, three cases between 4 and 5, and two between 2 and 3 units; of 4 cases with *Paratyphosus A* agglutinins one had between 4 and 5 and

specific agglutinins in large numbers of individuals and may perhaps be due to some non-demonstrable protective factors in the serum other than agglutinins.

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TABLE II.
Agglutination Reaction in Different Groups of Indians.

Group	B. typhosus.						B paratyphosus A.			B. paratyphosus B.			Shiga			Flexner.		
	Neg.	$+\frac{1}{125}$	$+\frac{1}{25}$	$+\frac{1}{50}$	$+\frac{1}{83}$	$+\frac{1}{125}$	Total.	Neg.	$+\frac{1}{125}$	$+\frac{1}{25}$	Total.	Neg.	$+\frac{1}{125}$	$+\frac{1}{125}$	Total.	Neg.	Posi- tive.	Total.
A	12	0	0	0	0	0	12	12	0	0	12	12	0	0	12	12	0	12
B	41	0	0	0	0	1	42	42	0	0	42	42	0	0	42	42	0	42
C	41	2	3	0	0	0	46	42	3	1	46	43	2	1	46	46	0	46

THE TREATMENT OF PSORIASIS BY INTRAMUSCULAR INJECTIONS OF MILK.

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THE treatment of psoriasis hitherto has been by internal medication and application of remedies externally.

Long continued internal and external medical treatment, with remissions and exacerbations of the lesions worries the patient to a very great extent, and if the eruptions appear on the face, especially of women, their company is avoided by others, though the disease appears not to be contagious.

In the two cases described below there was no history of rheumatism, osteo-arthritis or direct infection, though they were distantly related, yet lived in distant parts of the country.

Case 1.—The first case was a female, Mrs. F. E., aged about 32. She had extensive lesions on the trunk and extremities and even the face was not spared, the papules extending on to the head to the margin of the hair.

The lesions were so extensive that very little healthy space was left between the scaly patches to give intramuscular injections in the gluteal regions.

She had had both internal and external medical treatment for about four years with partial benefit at times, but with rapid reappearance of the lesions. Application of chrysarobin ointment had also no effect. Later on she was given neosalvarsan injections by a physician with exacerbations of symptoms. She was tired of life, and threatened to take her own life if she was not cured of the complaint.

At this stage she came under my treatment, when I thought of giving her intramuscular injections of milk before trying auto-hæmotherapy.

I gave her in all nine intramuscular injections of sterilised milk (autoclaved) at intervals of about five days.

The first injection was of 5 c.c., the subsequent injections were of 8 to 10 c.c.

There was very little fever; in fact a rise of temperature is not necessary for the disappearance of the lesions. Within the first three injections the lesions appeared to fade and by the time the ninth injection was given all the lesions had disappeared, leaving only pigmented spots; a few papules that remained disappeared under local application of an ointment containing hydrargyri ammoniata and acid salicylici which I had prescribed for her from the beginning of the treatment.

The disappearance and fading away of the lesions under the effect of the injections was very rapid, and could almost be compared with the disappearance of secondary syphilitic eruptions under neosalvarsan injections.

It is now nearly a year and a half since the injections of milk were given, yet there has been no return of the lesions except the appearance of one or two small papules which disappear as soon as she applies the acid salicylici and ammoniated mercury ointment. There has been no necessity to repeat the injections.

Case 2.—The second case was a girl, Miss L., aged 13 years, healthy in every respect excepting the eruptions on the body which were annular and resembled the photograph in Plate 21 of Sir Malcom Morris's book on *Diseases of the Skin*; the duration of the lesions was nine months.

Being related to the first case she at once came under my treatment. I put her on the same line of treatment

as in the first case, the eruptions beginning to fade rapidly after the third injection and disappearing entirely after the ninth.

Nearly six months have passed without any reappearance of the lesions. For the spots left behind after the disappearance of the lesions hazeline snow was applied, and caused them to disappear.

Both these patients were in good health; there was no history of rheumatism or osteoarthritis, nor was there any endocrine deficiency; there was rapid disappearance of the lesions under injections of sterilised milk.

As to diet, as soon as they came under my treatment I put them on ordinary diet, although before that meat, fish and eggs were prohibited.

A third case of psoriasis of both palms of the hands and soles of the feet in an old man aged 65 is under treatment and shows the same tendency to rapid benefit under local applications and intramuscular injections of milk.

How these injections of milk act one can only guess, and one can only suggest that there is bacterial infection which is terminated by the leucocytosis set up by the injections, which, attacking and killing the bacteria, stimulate the formation of immune bodies in the plasma causing the disappearance of the lesions.

The close analogy of the marked subsidence of psoriasis lesions under injections of milk with the termination of influenzal bronchopneumonia and encephalitis lethargica under the same milk injections as reported by others, and perhaps acting in the same way with the rapid subsidence of secondary syphilitic lesions under arsenical injection, is marked.

A CATARACT EXPRESSION OPERATION.

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THE best operation for cataract has ever been a controversial question. Surgeons who are well versed in operations for cataract are few, but it is a hopeful fact that those who are interested in the operation are always trying to effect improvement in their methods. The older operation by capsulotomy does not find favour with the majority of present-day surgeons. It often gives rise to after-trouble for the patient, and may be attended with indifferent results on account of the formation of secondary cataract. I have seen several such cases, with the operated-on eye practically without any vision and gradually closing to blindness, yet the operations had been performed by distinguished surgeons who had made their name as eye specialists.

Smith's expression operation is usually attended with uniformly good results, but

unless one is fully conversant with the technique, and one's assistant fully educated to help, the operation often results in failure. In this operation the duty of the assistant is difficult. If he is unable to overcome the action of the orbicularis, the patient will either squeeze out the lens, or the lens capsule will burst in the progress of the lens, and in that case Smith's operation in the end practically turns into a capsulotomy one.

A surgeon can only ascertain by continuous practice how any method can be conveniently improved on in the interest of his patients. I have been practising a modified Smith's operation for the past twenty years, and have found that the operation described below is most convenient and is uniformly successful.

After the usual preparation of the patient and cocainisation of the eye which is to be operated on, the knife should be introduced into the anterior chamber to its full length—or almost so, taking great care that the point of the knife does not touch the inner canthus or the side of the nose and thus cause pain to the patient, in which case he may give a start and disturb the operation. It should be noted that the knife must be extremely sharp and with the finest point, for both are essential to the success of the operation.

Next, the knife should be drawn slightly backwards, and at the same time its sharp edge tilted slightly backwards, so that the iris will lie over the cutting edge of the knife. In this way the surgeon can at once fix as much of the iris as he likes between the edge of the knife and the cornea, and, in completing the incision of the cornea can remove as much of the iris as he desires. The surgeon can easily settle the size of the coloboma which he desires to produce. The advantage of the method is that the patient is not put to the discomfort of a separate iridectomy. I have often known patients of a sensitive nature to squeeze out the lens and with it some of the vitreous, just after the completion of the (separate) iridectomy; this does not occur with the method advocated.

As soon as the incision is completed, my assistant holds up the Smith's speculum (which is always used) so as just to relieve the pressure on the eyeball, and presses back the orbicularis as much as possible. I supplement the strength of the upper blade of the speculum by a hook, and by this device it is possible to make the muscle entirely powerless.

It is now easy enough to apply gentle pressure by a hook to the lower edge of the cornea, or adjacent part of the ocular conjunctiva, and the lens presents itself in the wound of the cornea. If necessary, a little counter-pressure may be made by the hook, pressing up the upper lid, and the lens is then

delivered very easily. There is practically no escape of vitreous or prolapse of the iris. A very small loss of vitreous, however, does not injure the eye, whilst if a slight prolapse of the iris occurs, it can be rectified with the small spoon. The eye is now dressed with sterile unguent, hydrarg. oxidi flava on sterile gauze, and covered with a woollen pad, and both eyes bandaged for four days.

On the fifth day the dressings are taken off, and the operated-on eye cleansed with sterile lotion, all accumulated tears and discharge being removed. The operated-on eye is then re-dressed, and it only is bandaged this time. The eye is again examined on the eighth day, and, as a rule, is now found to have healed soundly. A green shade should now be worn for four or five days further, or for a week.

In all I have carried out some 5,000 operations for cataract; of which some 500 were carried out by the above method, with uniformly good results.

THE RATE OF LOSS OF HOOKWORM EGGS FROM FÆCES.

By P. A. MAPLESTONE, D.S.O., M.B., B.S. (Melb),
D.T.M. (Liverpool).

(Hookworm Research Laboratory, Calcutta School of Tropical Medicine. Supported by the Indian Jute Mills Association.)

WHEN one reflects on the enormous amount of work and the great volume of statistical information that has been compiled of late years regarding the question of hookworm infection, it is surprising that the rate of loss of hookworm eggs from fæces seems to have been very largely ignored. This was a matter of little importance in the days when the number of persons infected, and not the degree of individual infection, was the basis on which the importance of hookworm infection in a community was assessed, for the partial loss of eggs from fæces would only mean the possible missing of some of the lighter infections. But since it has been recognised that the true index of severity of infection in a community is the severity of individual infections, and not the total number infected, and since this is estimated by counting the eggs passed in the fæces, it becomes of great practical importance to know at what rate hookworm eggs disappear, if stools have to be kept some days before examination.

The possibility of such loss of eggs occurring is more or less generally recognized, for references to placing the stools on ice pending examination are fairly common in the literature, but precise information as to the fate of the eggs prior to reaching the ice-chest seems to be lacking, and in a large

country this period is probably often a matter of days.

Lane (1924, 1925) when testing his "D.C.F." method, gives some information on the effect of the immersion of fæces in either water or thymolised water for varying numbers of days before examination, and he shows the importance of keeping the specimens at a fairly low temperature during this storage. The same author also quotes Lambert, whose paper is not available to the writer, in which he says:—

"In the South Seas specimens have to be examined in twenty-four hours, or flotation methods are useless. Refrigeration is out of the question and no proper method of keeping specimens for a period that lends itself to ready examination has yet been devised."

This clearly shows that the rapid deleterious effect of fairly high temperatures on hookworm eggs is recognized, but it gives no information as to what this effect is, nor how it bears upon egg counting results.

In describing his method of conducting a survey of the whole of India, Chandler (1928) discusses the possibility of loss of eggs during transit of fæces to the central laboratory in Calcutta, but he dismisses it as improbable, because he only found normal-looking eggs when subsequently making his counts, and he ascribes this to the fact that the fæces containers were completely filled at the time of collection, thus excluding air and preventing development of eggs.

The writer, in the course of the present investigation, has made use of the same tins as those referred to by Chandler, and was surprised to find that there was no difference in his results whether the tins were completely or partially filled. Examination of the tins revealed the fact that the tin itself has an expanded ridge encircling it to check the descent of the lid, and that the flange on the lid is nearly 2 mm. deeper than the portion of the tin which projects above the encircling ridge. Therefore, even if the tin is completely filled and the lid tightly pressed down, there is a layer of air nearly 2 mm. in thickness above the fæces.

It was next tried if complete exclusion of air in the relatively high temperature of Calcutta would have the effect attributed to it by Chandler. This was done by carefully filling tins to the brim, and covering them with glass slides, through which it could be seen that all air was excluded. The subsequent counts of these specimens proved no better than those from partially filled tins, using the same fæces, and in some instances they were distinctly worse, for it was found that the gases generated by fermentation forced out some of the fæces from

the tin and allowed air to enter, and it also seemed that fermentation in those tins from which air was completely excluded was considerably more active than in partially filled ones; this in itself would probably lead to a greater destruction of hookworm eggs.

It might be thought that the process of fermentation easily forced off the glass slides lying loosely on the surfaces of the tins and that the same thing would not occur

their contents had escaped into the packet. This experience clearly indicates that transmission of faeces by post in a hot country is not a method that should be employed, if accurate egg counts are to be anticipated.

The faeces examined during the course of this investigation were placed in tins such as are described above, and put in a cupboard in the laboratory for varying numbers of days, as indicated in the table. All types of stool from quite liquid faeces following a

TABLE.

Stool No.	Number of days stored.										
	0	1	2	3	4	5	6	7	8	9	10
1	64	..	..	..	17	..	..	..	..	..	..
2	308	..	..	..	216	..	..	..	..	..	..
3	58	..	..	..	55	..	..	..	..	..	..
4	68	..	..	..	37	..	..	..	..	..	..
5	34	..	..	..	22	..	..	..	..	..	..
6	55	..	..	..	51	..	..	..	..	..	..
7	8	..	..	..	9	..	..	..	..	..	..
8	48	..	..	..	19	..	..	..	..	..	..
9	17	..	..	..	11	..	..	..	..	..	..
10	11	11	6	6	..	0	0	..	..	..	..
11	23	14	23	9	..	..	..	..	..	..	..
12	26	21	24	13	20	18	..	..	..	..	..
13	24	22	20	15	..	..	..	..	..	..	..
14	17	..	15	16	23	13	..	..	..	..	..
15	45	42	45	31	..	..	..	..	..	8	11
16	48	..	..	5	8	19	12	..	..	..	..
17	8	8	9	9	..	..	..	..	..	..	..
18	24	..	..	..	10	..	..	..	..	..	..
19	29	..	..	..	8	..	..	..	..	..	..
20	40	..	..	..	..	28	..	..	..	..	..
21	29	..	..	..	..	24	..	..	..	..	..
22	34	..	..	..	29	..	..	..	..	..	..
23	42	..	36	..	19	18	24	..	..	..	..
24	48	..	..	11	20	30	33	..	..	..	..
25	17	..	15	13	16	11	..	..	..	..	..
26	11	11	13	10	..	4	4	..	..	7	11
27	26	17	16	22	18	13	..	..	..	..	..
28	90	..	71	71	47	..	..	..	..	..	..
29	64	42	56	57	..	..	..	..	..	42	38
30	22	17	14	16	..	..	..	..	..	30	25
										11	10
Percentage Loss ..	0	21	15	36	42	45	54	..	..	53	55

NOTE:—The figures in this table are the actual counts made, therefore they should be multiplied by 100 to get the eggs per gram of faeces, and they are the average of two counts made by the same two observers on each occasion.

in a tin with a tightly fitting lid. Such is not the case, however, for the writer, as an independent check to his results, had a number of stool samples posted from the Hookworm Campaign Office at Madras. These were in well made tin containers with tightly fitting lids, and on opening the packet in Calcutta three days after it was posted in Madras, it was found that fermentation had occurred in thirteen of the sixteen samples sent, with the result that the lids were partly forced off, and a considerable portion of

purge, to the typical soft pasty stool usually seen in India were used. The observations extended from October until the following March, i.e., the weather was hot at the beginning, fairly cool in January and February, and hot again in March, and as far as this enquiry goes there is no indication that there is any smaller loss of eggs in the cooler months, nor does the loss seem to vary with the different types of stools used. Therefore, it may be concluded that the loss of hookworm eggs in stored faeces of any type

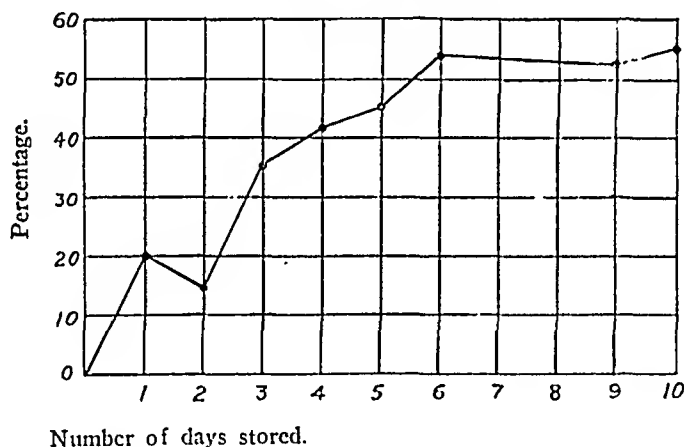
is fairly rapid, and the rate of such loss is uniform in the normal range of temperature experienced in Calcutta.

There are, of course, unavoidable variations in the regularly progressive loss of eggs from day to day in a single specimen; this is due to the unequal distribution of eggs in the fæces, and to the error that is always present in the egg-counting method of Stoll. To reduce the daily variation in results as far as possible, the writer has added the total number of eggs of all the specimens counted on any given day, and the loss is expressed as the percentage loss on the total counts of the same fæces on the day the stools were passed. The graph has been included as it gives a clearer idea of the regular drop in the number of eggs from day to day; the only exception will be noted in the second day, which shows a smaller loss than the first day. This is almost certainly due to the fact that the number of counts done is

due to development of those lying near the surface of the specimen, and that the hatched larvæ rapidly die in the pure fermenting fæces, which is not a favourable medium. The unaltered eggs seen are those from deeper layers of fæces in the tins, where they remain undeveloped in the same way that they do at the bottom of water, and it is many days before these eggs have sufficiently degenerated to become unrecognizable or to disappear altogether.

As it may be thought that the loss of eggs found is greater than actually occurred because only the top layer of the stool in the tins was taken when measuring the portion for counting, it should be noted that the specimens were well stirred before being taken from the tins, the measurement was done by displacement of three c.c. of decinormal sodium hydroxide, and the fæces were measured out by repeatedly dipping a straw deeply into the tin and transferring the

Graph illustrating the progressive loss of eggs during storage of fæces.



too small to entirely eradicate the sources of error referred to above, and if a larger number of counts were done this discrepancy would be rectified.

The figures indicate that there is a fairly rapid and steadily progressive loss of eggs from the first to the sixth day, and that after this the loss is much slower. It is therefore of interest to consider what becomes of the eggs. When examining a series of specimens from the same stool every day for several days, it is found that during the first three or four days it is quite common to encounter eggs containing larvæ, and in a few cases free larvæ were seen in the sample being counted, but the majority of the eggs seen are still normal and undeveloped. From about the fourth day onward, and even earlier in stools that have undergone very active fermentation, definitely degenerating eggs are found. The explanation of these observations put forward by the writer is that the original and relatively rapid loss of eggs is

adherent portion to the liquid until the required amount was obtained. It is thus clear that a sample representative of the whole depth of fæces in a tin was obtained, and it should be added that a new tin of fæces was used on each occasion a count was made, thus obviating the effect of mixing the fæces and bringing some of the deeper lying eggs to the surface, where they would undergo development.

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Indian Medical Gazette.

JUNE.

THE VITAMINES.

THE vitamins are becoming more puzzling than ever. No longer can the student rest satisfied with a neat little table showing the characteristics of vitamins A, B and C. Several new letters have to be employed and the old designations have been modified. Funk, who was one of the pioneers in the exploration of vitamins, now divides them into two groups: (i) the vitamins proper, which are nitrogenous and are easily destroyed by alkalies; and (ii) those vitamins which are non-nitrogenous, but are very sensitive to oxidation. In the former group are B, the antineuritic vitamin, C, the antiscorbutic vitamin, D, the stimulant of growth in micro-organisms, and possibly P, the hypothetical anti-pellagra vitamin of Goldberger.

With all due respect to Funk, it is a pity that he has accepted the French terminology by applying the letter D to a vitamin which is not concerned with the life of the higher animals. The letter D has already been applied to the anti-rachitic vitamin, and if we are to have a dispute as to the terminology, it would be far better to drop the use of letters altogether and designate the vitamins in terms of their action. There has lately been a good deal of confusion with regard to vitamin A, and it is likely that the slight saving of time and space which result from the use of artificial symbols will be more than compensated for by the fact that names which indicate the action of the vitamins will be far easier to remember, and will not be liable to alteration at the will of experts.

The second group consists of A, or anti-xerophthalmic vitamin; E, or anti-rachitic vitamin, and F or anti-sterility vitamin. Funk does not include the growth-producing vitamin, but he emphasises the fact that growth depends on the presence of important amino-acids, salts, vitamins, and other factors as well. He raises another important question: vitamins are not only necessary for the healthy growth of animals, they are also necessary for the active growth of certain tumours such as the Rous' chicken sarcoma. Other workers have produced cancerous growths in animals by diets which are devoid of vitamin A; whilst stone in the bladder can be produced in rats by diets devoid of vitamins.

We are at present at an awkward stage of development of our knowledge of the vitamins: a multiplicity of findings is being accumulated, but complicating factors are

present in abundance, and we 'cannot see the wood for the trees.' It is not merely the imperfectly understood vitamins with which we have to deal, but the complicated vitamins which occur between these and the other still more obscure substances which are present in the food. It is easy enough to devise satisfactory diets which will promote growth and maintain health, but when we insist on knowing exactly what part is played by each element of the diet and by all the elements when combined in various proportions, we must expect to embark on a long and toilsome voyage of discovery. Too often our fate will be to see a distant cloud and to cry out that we have sighted land. We owe a great debt to the students of the vitamins, but their services to humanity would be greater if they would content themselves with recording facts, drawing such conclusions as are justified by the facts, and speculating—only—on the bearings or possible bearings of their observations on the problems of disease. Much of the existing confusion has arisen from the tendency to regard isolated observations as complete explanations of problems which are many sided and complicated.

Some idea of the vast amount of work which is being done on the vitamins can be formed from a perusal of the abstracts of papers on the subject in the *Bulletin of Hygiene* for December 1927. Many of these are of a highly technical nature, and their bearing on disease problems is not always easy to determine.

The anti-neuritic vitamin is of special interest to us in India. Jansen and Donath of Weltevereden, Bavaria, claim to have produced this vitamin in the form of a crystallised hydrochloride, and Eijkman has found experimentally that this is a very pure substance. In the abstract of Eijkman's paper polyneuritis gallinarum is used as synonymous with beriberi, but it is possible that the name beriberi has been introduced by the reviewer. It would be somewhat surprising if Eijkman has implied the identity of the two conditions, seeing that he has hitherto been very careful to state that he does not affirm their identity.

Kon and Drummond have shown that many of the symptoms of avian avitaminosis are attributable to partial starvation, and not to vitamin B deficiency, as no differences could be observed in the utilization of food between the controls and the deficiency birds when the amount of food allowed to the controls was exactly the same as that eaten by the birds which were on a diet deficient in vitamin B. The only definite characteristics of vitamin B deficiency in the pigeon are lack of appetite for the deficient food and acute nervous symptoms. The decrease in weight, the green stools, and the fall in temperature are found to be due to partial starvation.

The work of Hasan, Drummond, Chick and Roscoe suggests that vitamin B is made up of two distinct factors, only one of which is concerned in preventing polyneuritis: the other is concerned with growth production and the healthy condition of the skin, and it is probably the same as the 'pellagra-preventing' factor of Goldberger.

Suzuki has tested the vitamin B content of the milk of women whose infants were suffering from infantile beriberi. His method was to observe the effect of the milk in stimulating the growth of yeast in cultures, and he found that fourteen specimens of beriberi milk contained about the same amount of the substance which promotes the growth of yeast as did the milk of control female patients who were suffering from influenza, whooping cough, malnutrition, etc. These results appear to suggest that infantile beriberi is not due to the absence of the yeast growth-promoting substance, which is presumably vitamin B.

The anti-scorbutic vitamin is believed by Rardoin and Lecoq to consist of two factors, one of which influences the health of the capillaries, while the other affects metabolism in general. These workers were the first to demonstrate the presence of two factors in vitamin B.

Evans and Burr find that the anti-sterility vitamin, E, which is contained in the wheat germ, loses its potency when mixed with lard, while it remains active when mixed with butter.

Shiga reports the production of beriberi in human beings when fed on a good and adequate diet, including parboiled rice but deficient in vitamin B. Three such persons developed acute symptoms of beriberi on the 45th and 47th days, respectively; two had lesser degrees of the same symptoms; one had acute cardiac failure, and one a dropsical form of beriberi.

It will be seen that we are still largely at the experimental stage in this matter, and in spite of the enormous volume of literature now extant on it, the chief need is for a clear understanding of the bearing of the facts elicited with regard to disease.

J. W. D. M.

THE POPULATION PROBLEM IN INDIA.

IN a report on the epidemiology of typhus fever in Ireland, published by the United States' Public Health Service in October 1927, there is startling evidence of the evil consequences which are likely to follow from an excessive increase of population. This report is one which ought to be read by every educated person in India, as it appears to contain a lesson for this country. Here are some of the facts. Within forty years

(1800 to 1840) the population of Ireland more than doubled itself, and became more than eight millions. At least half the people depended on the potato for subsistence. Stephen Gwynn thus describes the state of affairs which existed about 1840 in his book *Ireland*.

"In a parish with a population of 9,000 the only wheeled vehicle was one cart, there was one plough, sixteen harrows, twenty shovels, no pigs, no clock, three watches, no fruit trees; people slept naked on straw and rushes, men and cattle were housed together. The school teacher, a man of distinction, had a salary of £8 a year. The people had one meal a day, sometimes only one meal in two days. The poor became a teeming multitude, living on potatoes with a little milk. Over two million persons were in distress for more than half of every year. At least a quarter of a million were driven to beg on the roads before the potato harvest."

This is a startling picture of the state of a country which permitted the population to outrun the available food supply, and it is difficult to conceive that it is not a picture of what is happening in many parts of India to-day.

Dr. R. K. Das is reported as estimating that India can support adequately, with moderate opportunity for moral and material development, only one half of its present population. This pessimistic estimate does not take into account the possibilities which exist for increasing the food supply by improved methods of agriculture, and by industrial development. On the other hand, even if the most optimistic view is taken, we must admit that if every increase in the food supply is followed by an increase in the population we can only expect that a larger number of people will eke out a miserable existence without hope of betterment of their condition. It is true that India for many years has been protected from such a catastrophe as that which befell Ireland in 1846 and the following years, but in this country the process of restriction of the population is being pursued by Nature in a relentless manner. Insufficient food lowers the resistance to disease; malaria, respiratory diseases, tuberculosis, dysentery, and other diseases all co-operate to maintain the balance between population and food supply.

At first sight it would appear that the war against disease must inevitably be a hopeless struggle; but there is another side to the picture. Other countries have succeeded in establishing a balance of population without the help of disease and famine: India can do the same, but only on condition that she desists from the process of increasing the population by the marriage of immature boys and girls, who are compelled to become fathers and mothers of weakly children before they are able to maintain themselves in reasonable comfort. The pathetic contentment with their lot which characterised the people of Ireland in 1845 was rudely assailed by the potato famine of 1846-47: a similar fatalism exists in

India, and it will have to be removed by education if this country is to get rid of the evils with which she is beset on every side.

It is interesting to recall the words used by Lord Palmerston, Home Secretary for the United Kingdom, in 1853. He had been asked to appoint a national day of prayer and humiliation to avert the cholera which threatened the country. His reply was as follows: "The Maker of the Universe has established certain laws of Nature for the planet in which we live, and the weal or woe of mankind depends upon the observation of these laws. One of the laws connects health with the absence of the gaseous exhalations which proceed from over-crowded human beings, or from decomposing substances Lord Palmerston would therefore suggest that the best course which the people of this country can pursue to deserve that the further progress of cholera should be stayed will be to employ the interval..... in executing measures by which those portions of their towns and cities which are affected.... may be freed from the causes and sources of contagion, which, if allowed to remain, will infallibly breed pestilence, and be fruitful in death in spite of all the prayers and fastings of a united but inactive nation."

These words are applicable to all countries and to all times. There are two great laws of Nature which must be learned and obeyed. One is that diseases can only be prevented by removing their causes; the other is that the available food supply can maintain in health and comfort only a certain number of human beings. If the population outgrows the food supply, Nature will restore the balance by disease or famine, or both. We have the power of controlling our environment and of securing healthy and satisfactory existences, but only on one condition, that we do not expect the Maker of the Universe to abrogate the laws which He has established for all the creatures of the earth. Ireland has succeeded in maintaining a population of about four millions of people in reasonable comfort for the past thirty years; if the population were restored to its former figure of eight millions, all the resources of preventive medicine would fail to prevent famine and disease.

India may be able to maintain her present population in comfort by improvements in agriculture and industries, by preventing the drain which results from maintaining millions of useless cattle and the wasteful social customs which exist, but there is no hope of prosperity so long as every increase in the food supply is accompanied by a corresponding increase in the number of mouths which have to be fed. Our educationalists ought to study economics, and having done so they ought to teach the rising generation the principles which must be followed if human beings are to enjoy a reasonable degree of health and comfort.

A Mirror of Hospital Practice.

A CASE OF MYCETOMA OF THE HAND AND FOOT.

By M. G. RAMACHANDRA RAO, M.B. & C.M.,
Chief Medical and Sanitary Officer, Maharaja's Hospital,
Pudukotah (Trichy.).

NAME:—Ponnan, Age:—30, Residence:—
Valavampatti (Pudukotah State).

Admitted into hospital on October 29th, 1927.

Condition on admission:—Much emaciated, anæmic, sometimes with a low temperature in the evenings. There was pain in the affected limbs, more severe in the hand. He was



unable to lift the hand and leg. There was a discharge of sanious pus from the sinuses. Pulse:—Weak, small, 92 per minute. Respirations:—20 per minute. Urine:—Specific

gravity, 1,008; reaction, acid; no albumen, or sugar.

Appearances of the affected limbs:—

Right hand:—Swollen in a very characteristic manner with multiple sinuses exuding pus, swelling extended up to elbow with enlarged veins. Glands in the axilla were enlarged.

Left foot:—Swollen in the same manner with multiple sinuses and nodules. On pressure there was a discharge of pus with granules; the limb above was atrophied.

History:—Two years ago he felt a sort of numbness near the web of the index and middle finger. Some days after a bleb formed on the surface which burst and left a small opening discharging pus. Native medicines were applied with no effect. The whole hand began to swell slowly. Induration and nodules appeared in the palmar surface first. Then several new openings formed with discharge of pus and granules.

Six months before admission he felt pain in the big toe which began to swell some days after. Then the swelling extended to the sole; this became studded with nodules and openings with characteristic discharge of pus from sinuses. The limb above atrophied; no glands were affected. Since he was very weak and unwilling for amputation of the limbs, operation was postponed; meanwhile he was fed with nourishing food, and strychnine and iron injections given.

Antiseptic baths were given to the affected limbs. While he was improving a bit he developed diarrhoea which was not amenable to any treatment, as a result of which he became exhausted. He was discharged at his own request on 13th December, 1927.

ASCARIS INFECTION SIMULATING BRIGHT'S DISEASE.

By JAGADISH CHANDRA DUTTA, I.M.P.,

Raja Ali Tea Estate, Assam.

AN Ooria woman, Sita, aged 35 years was admitted into this hospital with general anasarca, dyspnoea, no appetite and a continuous feeling of heaviness in the abdomen. The liver and spleen were normal and there was no heart trouble. I examined her urine and found nothing except a quantity of albumin. I tried purgatives, diaphoretics, pilocarpine nitras, etc., and dietetic treatment, but the dropsy subsided only for a short period. She was treated as a case of Bright's disease. This was the third time she had been admitted into this hospital with the same complaint. There were no symptoms of worms at all. She was not anæmic; her hæmoglobin was 75 per cent. I tried oil of chenopodium and

carbon-tetrachloride mixture followed by salt. After the first dose she passed 200 round-worms, on the second day 150, on the third day 90, on the fourth day nothing, and on the fifth day 60, a total of 500 round-worms. Her heaviness of the abdomen, dyspnoea and dropsy all cleared up and her appetite became normal. I again tried the same medicine twice at weekly intervals, but no more worms were passed. The urine was again examined and no albumin was found. She is now quite fit and left the hospital fit and well.

A CASE OF LIPOMATOSIS.

By DAYA RAM KUMAR,

Assistant Surgeon, Muzaffargarh, Punjab.

THE photograph indicates a condition which needs no description; a few points in connection with this case are given below:—



He was a Mohamedan aged about 19 years—male. No family history. Duration 12 years, but he could not describe how it began.

His speech was thick but he talked well and could reply to questions. He was blind. He could take his food well. His memory was fair as he was learning the Koran by heart. Only the head and face were affected. He refused all treatment.

AN UNUSUAL CASE OF LOBAR PNEUMONIA.

By V. SIVAMANI,

Medical Officer, Sahmar Sugar Estate and Factory,
Sahmar (Myitkyina District).

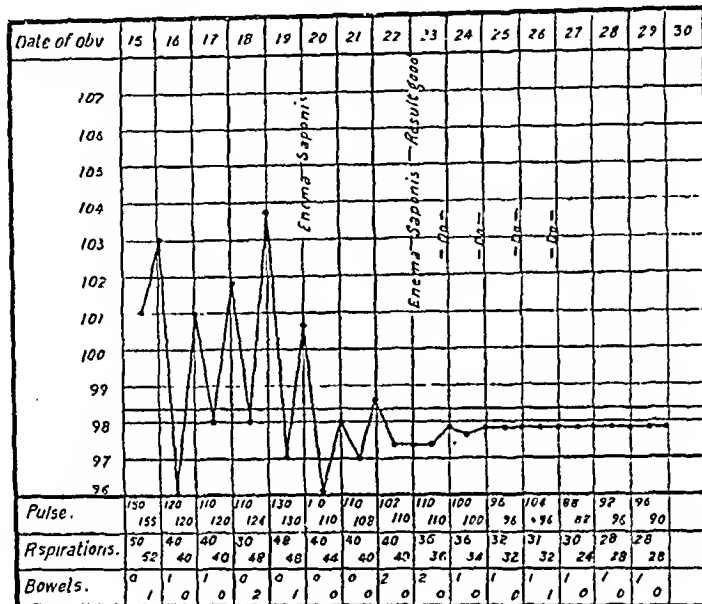
A EUROPEAN officer in the estate, aged 52, was attacked with fever on the night of the 14th January, 1928.

From the very outset almost all the signs of pneumonia were present, though not quite so evident for the first two days. The right lung was more affected than the left.

locally an Antiphlogistine poultice. From the 3rd day onward he was given an expectorant mixture with potassium iodide and creosote. On the 5th day he was given a hypodermic injection of nuclein, 1 c.c.

The collapse was combated by brandy internally and camphor in oil subcutaneously. Besides he had rectal administration of potassium permanganas, 8 oz., twice daily during the period of the crisis.

After a convalescence of about another week the patient made an uneventful recovery.



Except for the temperature chart all the clinical signs, consolidation, tubular breathing and rusty sputum, were in favour of the disease, but throughout the period of illness his temperature was peculiarly intermittent.

The possibility of malaria was not overlooked and repeated blood examinations proved "negative," except for leucocytosis which one would normally expect in a case of pneumonia.

Microscopical examination of the sputum showed only pneumococci and not tubercle bacilli, and hence acute pneumonic tuberculosis was ruled out. The daily intermission of temperature was very peculiar and strange, and I really doubted whether a case of pneumonia would ever show a chart like this. The district Civil Surgeon, Captain Davis, with whom I had the benefit of a consultation on this case, agreed with my diagnosis but was also surprised at the unusual type of temperature.

The disease was severe and the patient passed the crisis with great risk. He took nearly three days to recover from the collapse.

By way of treatment he was given a simple diaphoretic mixture for the first two days and

A CASE OF CONGENITAL DILATATION OF THE COLON, (HIRSCHSPRUNG'S DISEASE).

By KIDAR NATH DATT, L.S.M.F. (Punjab),
Canal Dispensary, Khanewal, Multan District.

A MALE child 40 days old was brought to me on the 17th July, 1927, with a history of extreme constipation alternating with periods of diarrhoea, dating from birth. During the periods of constipation the abdomen would become very greatly distended and the child would vomit most of his feeds. Pressure on the abdomen did not seem to be painful as he did not cry when this was applied. Each attack of constipation had been of increasing duration, followed by two days of diarrhoea. The current attack of constipation had lasted for seven days.

On examination I found his abdomen intensely distended and spherical in shape. The abdominal veins were prominent and very marked peristalsis of the gut was visible in the lower part of the abdomen. Resistance was felt on palpating the colon, and the sigmoid flexure was palpable and seemed to be thickened and enlarged. On percussion the abdomen was tympanitic except in the region

of the sigmoid flexure where there was a dull note. On rectal examination no obstruction was detected and a little fluid greenish matter came out. There appeared to be some difficulty in breathing, and the child was dull, quiet, and apathetic. The respiration rate was 60 per minute. The general condition was good and the child appeared to be quite healthy apart from the intestinal condition.

Treatment. A large sized catheter was passed through the rectum into the colon and some 4 ozs. of a foul greenish fluid evacuant was passed. Castor oil was given by the mouth and turpentine stupes applied to the abdomen. The only diet allowed was water. That day the child passed four similar fluid motions and the abdominal distension was reduced to about half its previous amount. On the 18th July there were six fluid, greenish motions, and a little milk was allowed.

On the 19th July the parents did not bring the child to the dispensary, and I learnt that he subsequently had a very severe attack of constipation. He was treated by a *hakim*, who tried a whole series of purgative drugs. This did not relieve the intense constipation, however, and the child died on the 25th of July.

The condition present could not be attributed to tuberculous peritonitis or to chronic indigestion and proved fatal, so a diagnosis of congenital dilatation of the colon appears probable. Death was presumably due either to toxæmia or to peritonitis.

A CASE OF PERSISTENT HICCOUGH FOLLOWING STRANGULATED HERNIA.

By A. SATYANARAYANA,

Sub-assistant Surgeon, Jaipatna, Kalahandi.

N., Hindu male, aged about 35 years, was brought to hospital at about 2 p.m. on the 3rd November, 1927, with the complaint that his old standing hernia had become irreducible for the past twenty-four hours, and that severe hiccough had set in. The swelling was very tender, whilst operative facilities at the dispensary were nearly nil. Taxis was tried, and after some half an hour's careful manipulation under chloroform anaesthesia the hernia was reduced. On recovering from the anaesthetic, however, hiccough recurred, was extremely persistent, and very distressing.

Morphia, gr. $\frac{1}{4}$, with gr. $\frac{1}{100}$ th of atropine sulphate was now given hypodermically, but only temporarily relieved the condition for a couple of hours.

4th November.—Condition as before with incessant hiccough, and the patient is much exhausted. Carminatives were given; morphia and atropine again injected; and at night gr. 3. of calomel with sodium bicarbonate. The patient passed four fluid stools during

the night and next morning, but his condition remained as before.

5th November.—A chloral and bromide mixture was given; also inhalation of amyl nitrite, and a blister to the root of the neck just above the clavicle. Morphia and atropine were injected hypodermically at night, but the patient had no sleep.

6th November.—The patient was now in a critical state, although the abdomen was flaccid, with no abdominal pain, tenderness, or vomiting, so peritonitis could be excluded. As a last resort a hypodermic injection of Harmon's solution—morphia and atropine in 4 c.c. of sterile 25 per cent. solution of magnesium sulphate—was given this evening. As the patient was an habitual drunkard, he was also allowed 3 ozs. of country spirits.

7th November.—The patient was hale and hearty, completely cured of his symptoms. Later, he was discharged in good health.

A CASE OF MALARIA SIMULATING CONFUSIONAL INSANITY.

By V. SIVAMANI,

*Medical Officer, Sugar Estate, Finlay Fleming and Co.,
Sahmaw, Upper Burma.*

A KACHIN boy, aged 15, working on this estate, by name La Noe, was brought to hospital on the 14th July, 1927, with a history of three days of fever. On admission he showed extreme prostration, a temperature of only 98.4°F., the pulse 144 per minute and feeble, and respiration rate 50. A certain degree of aphasia was noticed and he could only talk with difficulty. The tongue was thickly coated and moist, the bowels constipated, and the spleen enlarged to two finger-breadths below the costal margin. The liver was not enlarged.

The pupils were somewhat unequal and reacted only sluggishly to light. The muscles were very much wasted, considering the short duration of the illness. The knee jerks were exaggerated and ankle clonus present. Babinski's sign was present.

The diagnosis with such a combination of symptoms was difficult. He was given an enema, and blood films taken and examined for malarial parasites. None were found.

At 2 p.m. the same afternoon the patient passed into a violent and noisy state. At times he would sit in bed in a melancholic state, at others cry out and shout with anger. He made several attempts to escape from hospital, trying to take his bedding and feeding cups with him, and disturbing all the other patients in the ward. I could scarcely drag any answers out of him on questioning him, and finally he had to be tied down and a wardboy placed on duty to keep guard over him. His general mental state appeared in brief to be one of extreme confusion and hesitancy.

At 6 p.m. he was given gr. $\frac{1}{2}$ of morphia subcutaneously and 1 drgm. of paraldehyde by the mouth. In spite of this he was noisy all night and did not sleep at all.

15th July.—Temperature 99°F. During the whole day his condition continued as before, being violent, noisy and irrational. He was given saline purgatives, and the same hypnotics as before at night.

16th July.—Condition unchanged. Treatment as before.

17th July.—Condition the same; temperature 102°F. Blood films taken and examined, but again no malarial parasites could be found. I had previously, however, seen proved cases of malaria with such a confusional mental state, and so gave gr. 10 of quinine intramuscularly into the gluteal region.

18th July.—There was a marvellous improvement. The temperature was 97.4°F., he had slept well throughout the night; and the confused mental state had completely cleared. He now had a voracious appetite which was hard to satisfy.

The patient was now put on to quinine by the mouth, followed later by an iron tonic, and in a few days resumed his work. Interesting features of the case are the low degree of pyrexia associated with so disturbed a mental state, the failure to discover malarial parasites in the blood films, and the immediate response of the condition to quinine administration.

A CASE OF PELVIC PERITONITIS FOLLOWING PUERPERAL SEPSIS TREATED BY INTRAVENOUS IODINE.

By S. SEN, M.B., B.Sc.,
Medical Officer, Arakan Hill Tracts,
and

U. AUNG PHAW KHINE, L.M.P.,
Sub-assistant Surgeon, Civil Hospital, Paletwa.

A BENGALI woman, aged 16, a primipara, was admitted to the Civil Hospital, Paletwa, on the 27th January, 1927, suffering from acute abdominal pain, fever, and a foul blood-stained discharge from the vagina.

A month previously she had given birth to a full term child, without complications, her husband stated. The lochia, however, were very scanty and stopped on the second day. There was no tear in the perineum or laceration in the vagina. The child, however, died on the 15th day; soon after she commenced to feel pain in the lower part of the abdomen, and had a discharge from the vagina, with fever.

She came to hospital walking, but in a stooping posture and leaning on her husband's shoulder. On admission her temperature was 101°F., and pulse 110 per minute, and she complained of acute pain in the abdomen. The

bowels were loose and she vomited twice. She lay on her back with the knees well flexed, had great thirst, was restless and distressed, and appeared to be a typical abdominal case with sunken eyes, and furred tongue. The abdominal muscles were tense and the abdomen distended, especially below the umbilicus. The abdomen was tympanitic on percussion and hyperæsthetic above Poupart's ligament. There was a foul, slightly blood stained discharge from the vagina.

On vaginal examination the uterus was found pushed forward and a mass was felt in Douglas' pouch. The cervix was not freely moveable. No vaginal tear or laceration was found.

The diagnosis was obviously pelvic peritonitis following on puerperal sepsis. The patient, however, absolutely refused any sort of operative treatment, even exploration of the uterus. The problem therefore was how to treat her.

Treatment. 27th January.—An alkaline mixture was given together with ergot, and a hot vaginal douche containing tincture of iodine twice in the day. The temperature rose to 103°F. in the evening, pulse 120. She was very restless at night, and $\frac{1}{4}$ gr. of morphia was given. The patient was placed in Fowler's position.

28th January.—Temperature ranged from 102° to 103°F. and pulse accordingly. The patient was in great distress and pain, and the abdominal distension was very marked, even above the umbilicus. The vaginal douches were continued and saline administered per rectum. In the evening an intravenous injection of iodine, gr. $\frac{1}{2}$; potassium iodide, gr. 2; in 10 c.c. of distilled water was given.

29th January.—Patient's condition much the same. Treatment as on the previous day.

30th January.—Patient better. Temperature 99°F.; mental state brighter. The upper half of the abdomen is soft, but a definite mass is palpable below the umbilicus, chiefly on the right side. In the evening the temperature rose to 101°F., and there was again intense pain in the lower half of the abdomen. Morphia had to be given at night.

31st January.—Better. Temperature between 100° and 102.2°F.; pain confined to the pelvic region. Treatment as before, with the usual intravenous injection of iodine.

1st February.—Decided improvement. Fourth intravenous dose of iodine given.

2nd February.—General condition very satisfactory. Temperature between 99° and 101°F. Put on to a tonic containing iron, arsenic, and quinine.

3rd February.—Temperature normal, and abdomen flaccid. Very little pain and only a very scanty discharge from the vagina. On examination, the uterus was found in its normal position and the pouch of Douglas clear.

From this point the patient made a rapid recovery, and was seen by the senior author some time afterwards at her house, when her recovery was complete.

The case is of interest, as in view of the persistent refusal of the patient to permit the necessary operative measures one scarcely knew what line of treatment to adopt. We attribute her recovery to the intravenous injections of iodine.

SOME OBSERVATIONS ON THE VALUE OF NOVASUROL IN CARDIAC DROPSY.

By G. NARAYANASWAMY MUDALIAR, I.M.S.,
Triplicane, Madras.

HAVING read about the efficacy of Novasurol in cases of œdema, I gave it a trial in two cases of dropsy due to cardiac dilatation, and wish to record the clinical results obtained:—

Case No. 1.—The patient is a lady aged 30. She was anæmic during her pregnancy and gave birth to a child in August 1927. A fortnight after delivery œdema started in the feet and gradually increased, affecting the lower and upper limbs. I was called in to see the case on 14th September, when I noticed extensive dropsy of the body, the face, hands and legs being enormously swollen and tense. There was also some quantity of effusion in the peritoneal cavity and she had diffused bronchitis with a slight rise of temperature. The heart was dilated, the apex being displaced downwards and outwards; the cardiac sounds were feeble and there was a systolic hæmic bruit. The pulse rate was frequent, numbering 120 per minute; the patient had hard breathing and could not lie in the recumbent posture; the kidneys were intact. I gave her a mixture containing expectorants with digitalis, diuretin, injections of pituitrin twice daily and opened the bowels freely. Her conditions did not improve. I started injections of Novasurol on the 17th giving her one full bulb (1 c.c.) intramuscularly at intervals of three to four days. By the time the ninth injection was given the output of urine was increased and œdema had completely subsided, the diminution being first noticed in the lower limbs and then gradually in the rest of the body. The patient was able to lie down comfortably. The expectorant mixture with digitalis was continued during the whole course of treatment. The pulse and heart improved and the lungs also cleared up. She was kept on a simple diet with barley water, fruit juice and milk all the time. After the œdema had gone down I prescribed syrup of hæmoglobin. She came to my dispensary ten days ago for the last injection and I found her free from dropsy, though still weak and anæmic.

Case No. 2.—This patient is an elderly lady aged about fifty who has been subject to

chronic bronchial asthma for several years. Consequently her heart became dilated and dropsy set in about a year ago. There was dense œdema all over the body, hard breathing and severe cough. She discontinued my treatment a year ago. I happened to see her about two months ago and found her in a very miserable condition with the face and limbs considerably œdematous. She was scarcely able to lie down and was night and day sitting in a chair. The urine was scanty but free from albumin. I suggested to her the utility of Novasurol in reducing the œdema and on her agreeing to take the injections I gave her every third day one ampoule of Novasurol intramuscularly; by the time the box of ten ampoules was used up the dropsy had disappeared entirely. The patient felt much relieved and could lie down with ease, but the causative factor, viz., the weak dilated heart and underlying chronic bronchial catarrh still remained unimproved.

Conclusion.—First, Novasurol is undoubtedly a powerful diuretic in cases of cardiac dropsy. The drug can be relied upon to reduce the œdema, but has no influence on the ætiological factor. It may be stated, however, that in the above-mentioned cases the one significant fact was that the kidneys were healthy, though the quantity of urine secreted was scanty.

A BAEL FRUIT IN THE VAGINA.

By INDULAL S. DAVE, M.B., B.S.,
*Medical Officer, Civil Hospital, Kadi (North Gujarat),
Baroda State.*

A FEMALE patient aged about 50 years came to my out-patient department a week ago and asked for medicine for *masâ* which generally means, on this side of the country, piles or anything of such a nature at the anal region. Even syphilitic condylomata are spoken of as *masâ*. She would not allow any examination, so I prescribed the routine purgative draught and unguentum galli cum opio for external application for four days. On the fifth day she came and reported that she had been purged heavily but the *masâ* were not at all better. She demanded a personal examination this time by the female nurse. The nurse reported to me that there was something curious about the patient's vagina. She said the patient had been seen by her 2 or 3 months ago and she had felt something in the vagina like the head of a foetus and that it had now become bigger and had come nearer the vaginal opening. The nurse asked me to see it myself as the patient now allowed it, and also said there was some cancerous growth also.

On inspection I found an epitheliomatous growth of the whole of the left labium which bled on a slight touch, but was neither

full nor tender. The inguinal glands were not much enlarged, though distinctly felt as discrete glands on the left side. On my passing the fingers into the vagina, I was amazed to feel a globular mass filling up the whole of the vagina. I put in the index finger and the thumb to gauge its size and consistency. It was hard, globular, smooth though not without some fine roughness about it, but it had not at all the feel of hair on the foetal head. It was about 3 inches in diameter and could be moved freely in the vagina. It was not like a submucous uterine fibroid become polypoid and hanging loosely in the vagina through the cervix. There was no pedicle. It then at once struck me that a foreign body had been put in by the patient for some sort of treatment. On inquiry I was told that a bael fruit had been inserted. This is the fruit from which Ext. Bael Liq. has been prepared. On being asked the reason for putting in the vagina this particular fruit, the patient said that she had prolapsus uteri and as bleeding occurred from the *masâ* (the epitheliomatous vagina) she had put the fruit inside her.

This was a means invented by the patient herself to raise the uterus and keep it up like a pessary, and as bael fruit is used extensively in India for dysentery to stop bleeding, the patient thought it would have the same action in the case of her *masâ*.

NEOSALVARSAN INTRAVENOUS INJECTION: ITS EFFECT ON THE PATIENT AND THE DOCTOR.

By DINSUKHRAI GOVINDRAI,
Medical Officer, Junagada General Hospital, Junagada,
Kathiawar.

On March 12th, 1928, I was called in to give an intravenous injection of neosalvarsan to a private patient. It is my rule always to give a good purgative on the previous night and to examine the urine just two or three hours prior to actual injection. I also assure myself about the heart. Accordingly, having satisfied myself, I went to inject neosalvarsan. I began to inject and until half of the 10 c.c.s. of solution was injected the patient was quite cheerful, but when I had completed the injection, and began to address a few words to the patient, I failed to get a response from him. Immediately my attention was drawn to the patient, and to my dismay and wonder I found him death-pale, with no conjunctival reflex, no pulse at the wrist and with very shallow respirations numbering four or five per minute. The reader can easily imagine my mental state at that time, because in my 10 or 12 years' experience this was the first instance of such serious magnitude. I hastened to give him artificial respiration with cold

water douching over the face, and stimulants were administered internally. There was nothing at hand ready to give heart stimulants subcutaneously. I had to resort to artificial respiration for about 10 minutes and then only did the patient show any hopeful signs. He could talk after three-quarters of an hour. When he could talk, he complained of heaviness in the chest with giddiness. He remained listless for about three or four hours and towards the evening at about 6 p.m. he was again almost in his normal mood. It should be noted that—

- (1) the patient was perfectly healthy with hemiplegia of the left side;
 - (2) this was the third injection and with previous injections there had been no trouble;
 - (3) the patient is decidedly not of a neurotic temperament;
 - (4) he was not an illiterate villager who might be frightened by an injection; and,
 - (5) last but not the least, there was no mistake in the technique.
- In spite of all this the patient's condition grew alarmingly serious, and had the patient continued in the same condition much longer I think he would have died of coma, but heaven saved him to save me from perpetual disrepute.

Now the question which arises is this—supposing the patient had died, what would have been the position of the doctor? In big cities, like Bombay and Calcutta, there are coroners, there are medical councils, and there are expert and honest medical opinions to prove that the doctor is not at fault. But what in a small town or village? There are small Native States with full judicial powers. There are many such States where there is only one doctor, with one police officer, one magistrate and only one High Court and this High Court is generally in the person of the ruling prince. If a doctor is placed in such circumstances and if unfortunately the police officer takes an adverse view, how would a doctor save himself?

A CASE OF IMPACTED FOREIGN BODY IN THE ŒSOPHAGUS.

By MOHAMED HUSEIN ABDUR-RAZAK SOUDAGAR,
Medical Officer, Ranabennur Dispensary,
Dharwar District, Bombay Presidency.

A HINDU, 80 years of age, was brought to this dispensary at 1 p.m. on the 5th February, 1928, by the relatives who stated that the man had swallowed a fig (*Ficus glomerata*), known in Hindustani as "Gular" and in Marathi as "Umbar," which had stuck in the gullet preventing him from swallowing anything.

Condition on admission. The patient appeared to be very uneasy, making futile attempts to swallow. On making him drink a

mouthful of water he returned it after two or three vain attempts to swallow it. The breathing had become difficult from pressure of the foreign body on the back of the trachea, which is not cartilaginous posteriorly as it is anteriorly, and laterally.

Treatment. Attempts were made to push the foreign body further down by means of a stomach tube but to no purpose. It was then thought that a force from below, that is vomiting, would expel it. On enquiry it was stated that the man had gone out early in the morning without taking any food. However, a hypodermic injection of apomorphine was given; in about 6 or 7 minutes the very first reverse peristaltic wave of the œsophagus expelled an entire full grown fig measuring 2" long, 1" thick, and 1½" broad (flattened by the gums), to the great joy of the relatives and others who had gathered to watch the patient anxiously.

The noteworthy thing about the case is, that a simple reverse peristaltic action of the œsophagus without any other aid of pushing from below was effective enough to dislodge and expel the foreign body which appeared to have been caught firmly within about 2" of the pharyngeal end of the œsophagus.

AN INTERESTING CASE OF MALARIA.

By S. N. RAGHAVA, M.B., B.S.,

Railway Road, Aligarh.

The patient was a Mahomedan male, aged 40.

History. He complained that he had been suffering from frequent attacks of high fever for the last five years.

He used to get fever with rigors followed by high fever going up to 104° and 105°F. daily. This kind of fever went on for a week or two when he used to take brisk purgatives in order to get rid of fever. He had recourse to doctors for treatment, but quinine produced symptoms of anaphylaxis and he had to discontinue the treatment. He had no symptoms of chronic malaria and hence I did not believe his history, but he got another attack in my presence with typical symptoms of malaria, 104°F. temperature.

I was very much afraid of giving him quinine but was anxious to give him relief. I gave him Esanofêle tablets which gave him a lot of trouble; he had an urticarial rash all over the body, and a choking sensation in the mouth with hoarseness of voice. These symptoms persisted for some time and disappeared in a day or so.

After enquiry I came to learn that the administration of a bitter medicine by a Vaidya or Hakim produced the same symptoms, though it was "not quinine." I thought over the matter and came to the conclusion that the bitter principle of any drug might produce

these symptoms of anaphylaxis. Working on this hypothesis I decided to give him euquinine which he tolerated without much difficulty up to grs. 20 a day. He got rid of the fever and was all right.

TWO CASES OF CARBON MONOXIDE POISONING.*

By P. V. KARAMCHANDANI,

CAPTAIN, I.M.S.,

Commanding Indian Military Hospital, Pishin.

About midnight 1st-2nd February, 1928, two men went to sleep in a small room (8 × 7 feet) in this cantonment, with the door and the window closed and a pan of steam coal burning inside. As they did not get up by 9 a.m. next day (2nd February, 1928) and noisy breathing was heard from their room, with a smell of poisonous gas emanating from the chinks, the window was broken open. Both men were found unconscious, number one lying stark naked. I was immediately summoned and had them forthwith removed to the hospital. Their condition when I saw them first was as under:—

Case No. I (died). Case No. II (survived).
Private Syce No. 83986
Md. Khan. Dr. Abbas Khan.

General physique	Well built, aged 35 years.	Spare built, aged 25 years.
Coma	.. Deep. Unconsciousness complete.	Do.
Sensory functions	Abolished ..	Do.
Motor functions	Whole body in a state of motor paralysis.	Do.
Skin and tendon reflexes.	Abolished ..	Do.
Organic reflexes	Involuntary passage of feces. Eyelids closed. Conjunctivæ insensitive.	Retention of urine only. Do.
Eyes	.. Pupils moderately dilated; equal on both sides.	Definitely contracted; equal on both sides.
	Reaction to light nil.	Do.
Lungs	.. Both bases congested; crepitations all over.	Slight congestion bases; rest clear.
Breathing	.. 36 p. m. stertorous.	30 p. m. not stertorous.
Pulse	.. 77 p. m. full ..	64 p. m. weak.
Temperature	.. 97°F.; surface of skin cold.	Do.
Venous blood	.. Scarlet red ..	Scarlet red.

The urine of Case No. 2 was examined by Major C. D. M. Buckley, in-charge District Laboratory, Quetta, and was found to contain large quantities of lactic acid and traces of albumen.

* Published by the kind permission of the Director of Medical Services in India.

Treatment 10 a.m., 2nd February, 1928.
Both cases.

- (1) Oxygen inhalations.
- (2) Potassium permanganate solution 12 c.cm. (1 in 500 solution), intravenously.
- (3) Strychnine $1\frac{1}{30}$ grain, subcutaneously.
- (4) Hot water bottles.

No. 2 after potassium permanganate injection opened his eyes and showed distinct improvement in that:—

- (i) his eyes looked brighter, having lost their blank look;
- (ii) some response to external stimulation could be obtained;
- (iii) temperature rose to 99°F ., pulse to 80 per minute, and respiration came to 24 per minute. He regained consciousness at 8 p.m. on 2nd February, 1928.

Case No. 1.—After the first potassium permanganate injection opened his eyes which appeared brighter, vomited and looked better, the rate of respiration decreased, while stertorous breathing became less noisy. Within half an hour he relapsed into his previous condition. At 11 a.m. he appeared to sink, and respirations became irregular almost gasping like the approach of death. He was immediately given a second injection of potassium permanganate and his condition, like the sudden brightening up of a dying flickering candle when fed with oxygen, improved and respirations, though stertorous, became regular. Strychnine grain $1\frac{1}{30}$ subcutaneously was repeated and oxygen continued almost continuously. The above condition lasted till 8 a.m. on 3rd February, 1928, when he showed signs of sinking again and a third injection of potassium permanganate was given at 8-30 a.m., but there was no improvement and the patient expired at 9 a.m.

Autopsy of his brain only was obtained. There was a small quantity of fluid between the brain and the dura mater. There was no congestion of the brain or the membranes, while the consistency of the brain was normal.

The most striking thing was the vermilion red colour of the arteries and the veins.

REMARKS.

I. I have no doubt that these were cases of carbon monoxide poisoning. Firstly, the coal used was not charcoal, but steam coal, which when kept burning in a pan in a room has a low rate of combustion. Waddell says that a certain quantity of carbon monoxide is always formed during combustion under ordinary conditions of coal or fuel, but the amount is greatest when combustion is least active. Secondly, the blood was scarlet red

in colour and not darkened as is the case in carbon dioxide poisoning.

II. It is asserted that the compound formed by combination of carbon monoxide and hæmoglobin of the blood (carbonic oxide hæmoglobin) is stable and that it cannot be broken up by simple exposure to air or oxygen. If this be really so, how is it that Case No. 2 recovered although he had been inhaling the narcotic for over nine hours before he was seen and treated?

III. Whether potassium permanganate had any salutary effect? The sudden brightening up of the eyes was striking.

IV. Whether there are any cases of carbon monoxide poisoning on record who had been under the effect of the narcotic for such a long time and had recovered?

V. Had the naked condition of the body of the first on the cold night (temperature 11°F .) and congestion of both lungs anything to do with his demise, as compared to the want of this in the second case?

ATRESIA OF THE VAGINA AND CERVIX UTERI.

By A. F. W. DE COSTA, F.R.C.S., D.T.M.,
CAPTAIN, L.M.S.,
Civil Surgeon, Bilaspur, C. P.

A GIRL aged 14, well developed, well nourished, consulted me for a big tender swelling in the abdomen, felt just below the umbilicus. She had not menstruated. The diagnosis seemed to lie between an ovarian cyst and a subperitoneal myoma. A vaginal examination gave an entirely different aspect to the case. The patient was already prepared for an operation, so an anæsthetic was administered and it was found that there was no vagina—a case of atresia of the vagina. So I decided to cut it open and on doing so found the barrier about half an inch thick. On passing the finger through this the cervix could be felt, but there was no sign of an os—a case of atresia of the cervix uteri. This was opened and a probe passed into the uterus gently from which dark red viscid fluid came out, and on squeezing the abdominal tumour there was a rush of similar fluid until about 14 ozs. were drained, with the consequent disappearance of the abdominal tumour. The cervix, which was adherent all round to the vaginal walls, was dilated and freed, during which there was considerable bleeding. The vagina was packed all round the cervix to prevent further adhesions, and the patient made an uneventful recovery and went home happy. This is a very rare case of congenital atresia of the vagina and of the cervix uteri, while the rest of the internal genitalia were apparently normally developed, the vulva also being normal. I do not think there are many similar cases on record in the literature.

Current Topics.

Willem Einthoven.

By S. L. BHATIA, M.C., M.A., M.D. (Cantab.),
M.R.C.P. (Lond.),

CAPTAIN, I.M.S.,

Professor of Physiology and Dean, Grant Medical
College, Bombay.

"To have striven, to have made an effort, to have been true to certain ideals—this alone is worth the struggle."—*An Alabama Student.*

Willem Einthoven, one of the great leaders in physiology in our day, was an Asiatic by birth. He was born in Samarang, Java (Dutch Indies), on May 21st, 1860. His father was a medical practitioner there. After his father's death in 1870, his mother took her six children to Holland, and settled in Utrecht. Willem became a medical student at Utrecht in 1878. After obtaining his degree in 1885, he became an assistant in the Physiology Department of Utrecht University under Snelling and Donders. From there he went to Leiden. He was appointed Professor of Physiology in Leiden University at the early age of 25, a position which he continued to hold till the time of his death, which occurred at Amsterdam on September 29th, 1927.

His chief work in physiology consisted in inventing and perfecting recording instruments of extraordinary delicacy. This was due to his great knowledge of physics, in which he was unusually well-trained. In the early part of his career, his interest was attracted by optical problems, and he carried out investigations in regard to the effects due to colour differences in monocular and stereoptical vision, the determination of the cardinal points of the eye for different coloured lights with the help of the refractometer, etc. In 1900 he demonstrated that a very high frequency alternating current was capable of stimulating nerves. He also worked out the movements of the soft palate, the action of bronchial muscles, etc.

But the actual work which will make Einthoven's name immortal in the annals of physiology and medicine was in the field of electro-cardiography. He carried out researches in this subject for more than thirty years. Electric currents in an exposed beating heart had been demonstrated by Waller in 1887 by means of Lipmann's capillary electrometer, and he obtained photographic records of the same. He later showed that these currents could be demonstrated in the intact bodies of animals and human beings. Einthoven worked on the principle of the d'Arsenval galvanometer, and devised a special thread galvanometer to record these currents. This was first described by him in 1901. It consisted of a silver-coated quartz thread stretched in a field, strongly magnetic. The movements of the thread resulting from the passage of a current were magnified by means of a microscope and recorded photographically. This instrument was found to possess extraordinary sensitivity, and is now universally used in hospitals and laboratories. He obtained a standardised curve for human beings with this instrument, and described the waves P, Q, R, S, T, their significance and variations in health and disease. The leads I, II & III, now universally employed, were originally described by him. By means of a microphone, he obtained graphic records of cardiac sounds. This is not the place, however, to give a full account of all his researches. Suffice it to say, that electro-cardiography owes a great debt to Einthoven. Its application to medicine has already yielded very useful results, and in physiology this method of investigation has solved many problems regarding the action of the heart.

I have a personal recollection of Einthoven. I had the pleasure of seeing him at Stockholm in August 1926 at the 12th International Physiological Congress. One afternoon he presided over one of the scientific sectional meetings. A man of medium height and moderate build,

very calm, and dignified, wearing glasses, with grey beard and moustache, faultlessly dressed in black is the picture of him that I have in my mind. With his clear-cut features, sharp penetrating eyes, a kind and generous expression of the face, looking remarkably well and active for his age, he reminded me to a certain extent of my Professor the late Sir Clifford Allbutt, Regius Professor, of Physic at Cambridge. *Vultus est index animi.* Einthoven had a charming personality. Sir Thomas Lewis, his great associate in the same field of work, thus speaks of him: "A man of simple, almost of humble habits he (Willem Einthoven) was untiring in his work, in its exposition, and in the study of related problems. He awakened in both friends and associates a profound admiration by his genius, by the charming simplicity of his character, by his touching if not child-like modesty of thought and manner, by his patience, by his natural and profound courtesy, by the warmth of his hospitality to those privileged to enter his home, by his unswerving devotion to truth in the most exacting sense. These noble qualities endeared him to all who knew him at all intimately." He spoke English with perfect fluency. In fact in the particular section of the Physiological Congress already referred to, he contributed his own remarks in the English language. His exposition was clear, brief and to the point. He was a man of profound culture and learning and possessed delightful humour, gentleness and loving kindness. In his work, he exhibited extraordinary diligence, patience and accuracy and by his labours strove persistently to add to the store of human knowledge. Owing largely to his work, the University of Leiden became renowned in the whole of Europe.

For his researches in physiology and medicine Einthoven was awarded the Nobel Prize in 1924. In the same year he was made an Honorary Member of the Physiological Society of England. In 1926, he was elected a foreign member of the Royal Society of London.

He remained in harness till he died in his 67th year. By his death physiology has suffered an irreparable loss. He belonged to that distinguished band of workers, to which men like Gaskell, Langley, Schafer, Sherrington, Gley and others belong, who during the last forty years or so have done so much to make physiology what it is to-day. Although he is no longer with us, Einthoven's work will live, even as the work of Johannes Muller, Carl Ludwig and Claude Bernard does, for all time, and his personality will remain a source of inspiration to all those who came after him.

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The Tropical Diseases' Bulletin and a New Departure.

We regret that the pressure on our space has previously prevented our commenting on a new departure by our admirable contemporary, the *Tropical Diseases' Bulletin*. We need not emphasise the fact that the *Bulletin* is absolutely essential to every practitioner of medicine in the tropics: for month by month it summarises the whole of the published literature on tropical medicine, and there is no other journal which can quite take its place.

The new departure consists in a "historical" section dealing with early records of research and discoveries in the domain of tropical medicine. In the first number to contain such a section—that for May 1927—Mr. Clifford Dobell, F.R.S., deals with tropical medicine of the Portuguese of the *renaissance*, with notes in the 16th and 17th centuries on dysentery from Dutch authors; Col. W. P. MacArthur with the history of plague in the Middle Ages—a series of reviews of different papers, all of great interest—Lieut.-Col. A. Alcock, F.R.S., I.M.S. (retd.), with malaria in Les Dombes in the valley of the Rhone in the 18th-19th centuries, and with

old time leprosy in the days of Robert the Bruce. Ancient records with regard to dysentery and scurvy are also dealt with.

In all, a delightful number. There are to-day a few—but only too few—journals dealing with the history of medicine, first among which must be placed the sumptuous *Annals of Medical History*, which deals especially with America. The *Transactions of the Royal Society of Tropical Medicine and Hygiene* have always been remarkable for their reports of Dr. Andrew Balfour's delightful essays on the pioneers of tropical medicine; whilst the *Edinburgh Medical Journal* has always paid attention to the past history of medicine. With regard to India, the subject has been but very partially explored. In the first two editions of Sir Leonard Rogers' *Fever in the Tropics*, there was an introductory chapter on the historical aspects of the subject, which was of absorbing interest, but it was deleted in the third edition.

The history of medicine, and especially of tropical medicine, is not unimportant. Most diseases of the tropics are of parasitic origin. Now the evolution of our knowledge of such diseases may be said to pass through certain well established phases: there is first the phase before the parasitic cause is discovered. During this, the physician has to depend entirely on his clinical acumen for his success in treatment, and hence this period is characterised by the rise of the great clinicians, from the days of Sydenham to those of Sir William Osler. The second phase opens with the discovery of the parasitic cause of the disease, and attention is now concentrated on laboratory methods of diagnosis. The third phase opens with the recognition of the fact that, if the causative parasite is important, of not less importance is the soil in which the seeds of disease are sown. With this phase is associated the recent rise of biochemistry in medicine. The fourth phase, as Sir Ronald Ross has insisted in his *Prevention of Malaria*, is the recognition that we must have quantitative as well as qualitative measures of disease, that mathematical and statistical methods must be introduced into the study of disease, whether in the individual or in the mass.

And the study of the history of tropical medicine very clearly illustrates the evolution of these four phases. It is not unimportant to get back to those wonderful early clinicians in India, or even further to the famous Indian clinicians of the Vedas; to study the evolution of the science of tropical medicine in this and other tropical countries. Castellani and Chalmers' well known *Manual of Tropical Medicine* is of special value for its wealth of information on the history of the subject, but perhaps textbooks of tropical medicine might well include, for the benefit of future generations, one or two introductory chapters on the subject.

In any case we are delighted to bring to the notice of our readers the new departure on the part of our well known contemporary. The *Tropical Diseases' Bulletin* only costs 21s. a year, and is or should be the vade-mecum of medical practitioners in the tropics. The editorial office of the journal is the Bureau of Hygiene and Tropical Diseases—23, Endsleigh Gardens, London, W. C. 1.

The Cinema in Medical Education.

THAT the world moves too fast has always been the complaint of the middle-aged. But both youth and middle age, as far as the medical profession is concerned, are agreed that the present medical curriculum is too congested, and that something will have to be done to reform it.

Is that "something" the cinema? We are tempted to ask the question on receipt of a copy of a most interesting address on the "possibility of medical movies" by Dr. J. F. Montague, M.D., F.A.C.S., to the American National Board of Review. In olden days the making of a doctor was a simple matter; the would-be candidate apprenticed himself to a local medical celebrity and subsisted on the crumbs which fell from the great man's table, or else after study set up for himself in a less

densely populated part of the countryside. But universities, medical Registration Acts, and legislation in general have revolutionised "the good old times."

In some ways this is a pity, for there is nothing which can replace the intimate touch of personal teaching between master and disciple. It has always been such personal teaching of the essentials of clinical medicine that has distinguished British medicine.

To-day, however, the highways of medical education are over-congested, and Dr. Montague calls in the cinema to re-adjust matters. The medical school books of the future, he claims, will be made of celluloid. In the teaching of anatomy cinema demonstrations can give the student a real and vivid presentation of the subject (but not—we venture to submit—if they go through at the speed at present current in the cinematograph). Every detail of medical and surgical technique can be made visible on the moving film; in fact a cinema film photographed from just above the operation site will give a student a far more vivid and true picture of the steps of the operation than he can obtain by overlooking the operation from a side gallery where he obtains but a partial view. "These films have the advantages of presenting clear and detailed data, and making these data permanently and instantly available; of being readily accessible and capable of countless repetitions. Moreover films are capable of additions, selection, editing and re-arrangement." Experiments in physiology may be demonstrated on the films, and full details of diseased conditions exhibited much more fully than they could be on the actual patients themselves. The film will save the student's time, for it will give him a rapid visualisation of the subject, and leave him time for its more detailed study in textbooks.

In public health propaganda the cinema has come to stay; in fact it is not too much to say that if ever a "public health conscience" is to be awakened in India, the cinema may be the most important factor in its creation. All Directors of Public Health in India have realised this, and the "exhibition trains" which now traverse the rural parts of India on the different railway systems always make a special feature of public health propaganda films.

We are all in favour of the cinema in medical education, for its educational value is enormous. We are accustomed, indeed, to use it very largely ourselves. If one has described the life-cycle of a parasite to a class of students, nothing will impress it more on the class than to see such a life-cycle on the screen. We have "mechanised" the Army—much to the disgust of its cavalry regiments. But, a question lurks behind. Are we going to mechanise the teaching of medicine? We rather fear for the medical student of the future. If his knowledge of anatomy, physiology, surgery, and obstetrics is to be derived from the films, we fear that it will become too superficial. If his knowledge of cardiac sounds is to be derived from the loud speaker, we fear that he may not recognise them through the stethoscope. The cinema has its place—a very important one, we would judge—in the medical education of the future; but neither it, nor anything else, can replace the personal touch of master and pupil. We can imagine the medical student of 1950 instructed in the dissection of the head and neck by a study of a cinema film, but we wonder whether he will derive as much information of real value from it as he would from dissecting out that area for himself. The cinema is an invaluable adjunct to medical education, undoubtedly; but it remains an adjunct, and we would resist to the utmost any tendency to "mechanise" medical education.

Milk Injections in Leprosy.

IN the *Transactions of the Royal Society of Tropical Medicine and Hygiene* for January 1928 (Vol. XXI, No. 4, p. 305), there appears an amazing—not to say amusing—article by Dr. N. A. Dyce Sharp, of the West African Medical Service, Nigeria, on "a new treatment for the leper."

Dr. Dyce Sharp first comments on the fact that what most workers on leprosy appear to aim at is producing severe, but not too severe, reactions in the leprotic tissue by the injection of various products. The efficiency of moogrol intravenously appears to be in proportion to the severity of the initial reaction. Sir Leonard Rogers notes that the cases which reacted most favourably to sodium gynocardate and sodium morrhuate were those which showed most reaction, although he regards such cases as very exceptional. Waldron, in a study of moogrol treatment in West Africa, states that he usually aims at a definite febrile reaction lasting for two to three days.

The rest of the story must be given in Dr. Dyce Sharp's own words, which we quote almost *in extenso* from his article.

The Choice of an Agent.

These observations seem to indicate that the essential feature in the treatment of advanced cases of leprosy is the degree of the initial reaction, and it would, therefore, appear that any substance which will produce a smart reaction in a leprosy individual will, in all probability, achieve a beneficial result quite apart from any specific action. If this is so, the shock which we have learnt to produce by the intravenous of various protein bodies should in such cases have an equally potent action, and it is the purpose of this note to suggest that most of the beneficial results of intravenous medication on the leper are thus produced and to put forward a ready method of achieving this end which is both cheap and easily administered.

Given that the shock is to be produced by a protein body, it remains to decide what form of protein is best suited to the purpose.

T.A.B. vaccine—the protein most popular in England, is not available in the tropics, and is in any case too costly for use on a wide scale. *Egg albumen* is perhaps the next best form in which to administer it, but fresh eggs are desirable, if not imperative, and to spend one's days squeezing premature eggs out of tardy layers is a tedious and tiresome occupation. *Fresh milk* is rarely available in tropical countries, but *tinned milk* prepared under the most hygienic conditions and perfectly free from preservatives of any sort can readily be obtained in any part of the world. "Milkmaid Brand" was chiefly used by the writer for the bulk of the cases, but "Ideal Milk" was also used in some of the cases intramuscularly. The mode of preparation is identical but there is a slightly higher solid content in the latter.

The Procedure.

The procedure was as follows:—

The top of the milk tin was cleaned and a small hole made in it with a sterile nail.

Two or three c.cm. of milk were slowly drawn up into a 10 c.cm. syringe and diluted with distilled water in a test-tube so that the strength of the solution was 1 in 10. The standard dose of 0.5 c.cm. of tinned milk was therefore contained in 5 c.cm. of diluted milk.

The injection was made very slowly into the vein and the patient was immediately placed on a couch with the head as low as possible.

The Results.

With a reaction of average severity there was first of all a feeling of giddiness coming on within half a minute and the patient might fall before reaching the couch. Within three or four minutes there would be marked respiratory distress and often precordial pain of greater or less severity. Commonly a dry irritable cough would occur and might last for ten minutes. Within five minutes of the injection there was always intense pain in all the joints, especially in those already affected, together with a very severe frontal headache, but the most pronounced seat of the pain was usually in the lumbar region. After another five minutes a profuse perspiration would appear on the face, and thereafter there would be a general amelioration of all the symptoms; the pulse, which had become gradually

feeblér until quite imperceptible, would now become bounding and regular; the pains would diminish but not disappear and the respiratory distress would vanish. After half an hour or more the patient was generally able to go home. At night the secondary reaction would set in and the temperature would rise to 103°F. or 104°F. and there might be a nocturnal rise for several nights. No food was allowed on the first night and there was rarely appetite on the second day.

The effect of the first injection was in each and every case to give complete relief from pains in the joints and bones and from formication within twenty-four hours. This was all the more remarkable because as a rule at the end of twenty-four hours the leper was still suffering from fever and anorexia, but his relief from pain was so profound and so rapid as to overshadow the ill-effects of the injection. At the end of forty-eight hours the temperature was usually normal, there was almost complete freedom from pain (the exceptions being septic ulcers which remained painful until clean) freedom from formication at night and marked reduction in hyperæsthesia.

Within a week red maculæ would be appreciably black in the centre and the red margins less pronounced. Perforating ulcers of the soles of the feet may become painless and clear up in three or four days. In three cases nodules on the brows and ears have been absorbed in ten days, and in most of the cases the skin resumed its normal unwrinkled appearance, to the amazement of the leper's friends, in two to three weeks. In one case this change was apparent in the first seventy-two hours.

The improvement and the changes described are not necessarily permanent and relapses are apt to occur. A second injection may then give further beneficial results which, however, are less marked for obvious reasons.

In two cases—an old man of 55 and a frail woman of 50—the injection was given into the buttocks. Given thus it may be almost painless or, more commonly, extremely painful. When given into the muscle there is little if any immediate reaction but, provided there is a smart febrile reaction a few hours later, the end results seem to be the same.

This note refers to twelve cases only. Of these only four have been followed up for as long as five months. The rest drifted away because, it was alleged, they found themselves cured. There was no doubt of the benefit they had received. One boy who had only been able to crawl the few yards to the hospital and back for many months while undergoing treatment with moogrol was later seen carrying an eighty-pound bag of rice on his head from the beach to the town. He had had two milk injections. In another case a former blacksmith was enabled to resume his occupation in Government service after five injections of milk. He had had previously one year's intramuscular moogrol and seven months' intravenous moogrol.

Discussion.

This treatment, which is admittedly drastic and undoubtedly dangerous, seems to be especially applicable to the late and more hopeless forms of the disease. Like so many other remedies it will not replace lost fingers and toes, but it can and does have a profound effect on the torpid indolent ulcers that affect the extremities, and can assist to heal otherwise incurable ulcers. It is possible that this treatment has no effect on Hansen's bacillus, but it has at least enabled the majority of cases treated to earn their own living once more in more or less strenuous employment. And this is what the leper wants. Whether it would be of service in the early cases of childhood has yet to be determined. Probably, it would prove decidedly harmful. The severity of the immediate reaction is at times so extreme as to be positively alarming and it is only the otherwise hopeless prospect of the patient that has made this particular investigation feasible.

Desperate remedies are sanctioned by desperate cases, and the dangers inherent in a line of treatment of which the physiological mechanism is still so obscure are manifestly considerable. But having acknowledged

its disadvantages, its vast possibilities of benefit to the hopeless leper remain, and this paper will have served its purpose if it draws the attention of medical men in charge of leper camps to a line of treatment which demands extensive and careful investigation under all sorts of conditions.

Leptospirosis in Malaya.

AN exceedingly interesting paper on this subject by Dr. William Fletcher, M.D., M.R.C.P.,—formerly Director of the Institute for Medical Research, Kuala Lumpur, and now Secretary to the Medical Research Committee of the Colonial Office under the British Medical Research Council—appears in the *Transactions of the Royal Society of Tropical Medicine and Hygiene* for January 31st, 1928 (Vol. XXI, No. 4, p. 265). As with all Dr. Fletcher's papers, this one is illustrated by most admirable photographs taken at post-mortem examination of patients or inoculated animals. The paper indeed constitutes a standard account of Weil's disease as it is met with in Malaya, and will be of special interest to those who are on the look out for similar cases in India, where the disease almost certainly occurs. Malaya, explains Dr. Fletcher, is not only relatively healthy; it is also relatively wealthy; and "the Government is very ready to help medical research in every way by providing equipment and money."

The first patient observed was diagnosed almost by accident. In trying to obtain the virus of "tropical typhus" the blood of suspected patients was being inoculated into guinea-pigs. This patient—a Punjabi—had been suddenly taken ill five days previously with severe pains in the head, fever, and vomiting. His eyes looked as if someone had thrown pepper in his face, and there was hyper-acute pain in the muscles of the arms, legs, and back. The urine showed a trace of albumin, and there were a few rose spots on the back and in the axillæ. The temperature finally came to normal on the 9th day.

Obviously this was not typhus, and but little further attention was paid to the matter until one guinea-pig died and the other became severely ill 13 days later. Both showed extreme jaundice and hæmorrhage from the nose. On post-mortem examination leptospira were found in the blood and in films from the liver and kidneys. The virus proceed fully virulent on passage. The cardinal lesion in inoculated animals is one which we believe has not been previously described in the textbooks; a condition of "butterfly lung." In this, in addition to jaundice of the lungs, there is hæmorrhagic and circumscribed mottling of the lungs, so that on section the lung resembles a butterfly's wing in appearance. In addition to this, post-mortem examination of the inoculated animals shows an almost universal condition of jaundice and hæmorrhage.

For culture of the leptospira the following simple medium was found to be most satisfactory: it consisted of 5 c.c. to 7 c.c. of sterilised tap water or distilled water, with the addition of 0.5 c.c. of melted 2.5 per cent. nutrient agar and 1 c.c. or a little less of rabbit serum. To inoculate the medium from the patient's blood, 0.5 c.c. of blood is withdrawn from the vein and added to the medium, which is incubated at body temperature and examined under the dark-ground at the end of a week. Leptospira usually appear in the bloodstream about the 5th or 6th day of disease, and usually disappear again about the 7th day of disease. (It is probably precisely this fact which makes it so difficult to establish the existence of Weil's disease in India.) If immune serum be added to the culture tube before it is inoculated the leptospira show agglutination into granular lumps and granules as they grow, and not the diffuse hazy growth in the upper half of the medium that occurs with normal rabbit serum.

The leptospira, Dr. Fletcher notes, are very difficult to see in the patient's blood by examination under the dark-ground microscope. They are so small, so thin, and so very active that their movements do not disturb the red corpuscles, as those of relapsing fever

spirochaetes do. "All that one sees is a flash of light, and they are gone." A far better method is to stain blood films by Fontana's method. The leptospira in the blood are always very scanty, however; they were only found in blood films from 3 out of 32 cases investigated. Blood culture is far more satisfactory and almost always yields a positive result, if carried out before the 8th day of illness.

Leptospira appear in the urine, and can be detected in the centrifuged deposit from about the 15th day of disease onwards; the urine has been found positive as late as the 32nd day after onset of the disease, and well into convalescence, but this point could not be properly studied because patients would not stay in hospital after they were convalescent. The leptospira in the urine are not the delicate, beautiful, actively motile forms seen in culture, but sluggishly motile or dead and often loaded with adherent debris which gives them a "mossy" appearance—the so-called Rieckenberg phenomenon. Probably there are immune bodies excreted in the urine, and these tend to paralyse the spirochaetes. Again, culture, or inoculation of guinea-pigs is the most certain method of isolating and demonstrating the organism. In general, it may be said that the urine is positive from the 15th to the 25th day of illness.

There then follows an account of an investigation into the serological reactions of the strains of leptospira isolated, both by agglutination methods and by the Pfeiffer reaction. Strains supplied by workers in other parts of the world were also tested. The general result is to classify the leptospira into six main groups; *L. icterohæmorrhagica* and *L. icteroides*, which behave alike; *L. hebdomadis*, type A; *L. hebdomadis*, type B; *L. pyrogenes*; and two other unnamed groups. *L. icteroides* behaved in every way like *L. icterohæmorrhagica*, thus confirming the recent contention of American workers that *L. icteroides* is not the causative micro-organism of yellow fever.

Of the 32 cases only one proved fatal, and this patient appears to have contracted the infection in the hills 40 miles from Kuala Lumpur. The disease in brief is one of the country, and not of towns. Sudden onset is noted as a marked feature—31 cases. Great prostration was present in all; agonizing muscular pain and tenderness in 29; casts and a trace of albumin in the urine in 28; and acute redness of the eyes in 22. Jaundice was absent in 18 of the 32 cases. Epistaxis was present in 4 cases, other hæmorrhages in 2, and a hæmorrhagic rash in another 2. Vomiting was present in 15 cases and intense headache in 8; diarrhoea in 6. Taken together, these symptoms form a very definite clinical picture, with the diagnosis confirmed either by culture or inoculation of guinea-pigs. The duration of the fever varied from 6 to 12 days, but was most commonly about 8 to 9 days; the fever is not a "seven-day fever" in other words.

Possibly associated with these cases was a curious epidemiological phenomenon. What appears to be true Weil's disease has previously been recorded by a few observers in Great Britain as occurring among dogs. Now in the previous Christmas there had been very severe floods in Malaya, and this had been followed by an outbreak of epidemic hæmorrhagic jaundice among dogs in Kuala Lumpur. Post-mortem examination suggested that this was due to leptospirosis, and finally a leptospira strain was isolated by inoculation of guinea-pigs. Puppies proved experimentally susceptible to inoculation with this strain. The dog strain proved serologically identical with *L. hebdomadis*; and the disease was especially associated with hæmorrhages into the mucous membrane of the stomach.

Leptospira were also isolated from the Kuala Lumpur water supply, and from rats in the locality, the rate of infection among the latter being as high as 26 per cent. These strains of rat origin again corresponded serologically to *L. hebdomadis*. The water leptospira proved to be practically non-pathogenic to guinea-pigs.

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In the discussion which followed the reading of Dr. Fletcher's paper several well known workers took part. Major H. C. Brown, I.M.S. (retd.), commented on

the value of Dr. Fletcher's culture medium, which he had since found to be of great value. Dr. Manson-Bahr commented on the great variability of symptoms and of mortality in leptospiral diseases. Dr. Andrew Balfour discussed the possibility that *L. icteroides* is the same organism as *L. icterohæmorrhagicæ*; Dr. C. M. Wenyon the possibility that non-pathogenic strains of leptospira might acquire virulence under certain conditions.

The whole paper and discussion are of great importance in tropical medicine, and we would refer laboratory workers and clinicians alike to the original text. It is a paper which marks a very definite step forward in our knowledge of leptospiral diseases in India and the adjacent countries.

Beri-beri in Burma.

IN connection with the beri-beri problem, Burma perhaps presents unusually interesting conditions. True beri-beri is well known in Malaya, whilst epidemic dropsy—if this disease be regarded as a "wet" type of beri-beri—is often epidemically prevalent in Bengal. Geographically, Burma occupies an intermediate position between the two, and if beri-beri is an infectious disease, its relative prevalence in Burma would be of interest. Further, if beri-beri is not an infectious disease, but is a food-intoxication disease due to diseased rice or other food, then, since the population of Burma consists of so many different and mixed races with different dietaries and habits, the study of beri-beri in Burma cannot fail to be of interest.

A report on the results of a preliminary investigation into beri-beri in Burma by Lieut.-Col. J. Taylor, D.S.O., I.M.S., Major C. de C. Martin, I.M.S., and Sub-assistant Surgeon U. Thant, from the Pasteur Institute of Burma, constitutes *Indian Medical Research Memoir No. 8*, March 1928, published as a supplement to the *Indian Journal of Medical Research* (Thacker, Spink and Co., Calcutta; price Rs. 2-12-0).

After presenting a detailed analysis of all the figures and information available, the authors conclude as follows:—

1. (a) Over the greater part of the populous agricultural areas of Burma beri-beri is not endemic or epidemic to any extent, and although cases do occur, their total number is small.

(b) There is a regular annual incidence in the larger coastal towns, notably Rangoon and Bassein, which mainly affects Hindu labourers who are temporary immigrants from India.

(c) Outbreaks of beri-beri frequently occur in certain small communities living under special conditions. These epidemics occur in timber-felling camps in forests, military police posts, schools, lock-ups, light-houses and light-ships, etc.

(d) In one outlying area of the province, viz., the Upper Chindwin district, beri-beri is probably of more frequent occurrence than in the rural areas of the rest of Burma. Other such areas may exist and require further investigation.

2. (a) The diet of the average Burman, both in towns and villages, is generous and varied and comprises a good allowance of other articles in addition to rice. In the villages a good quality of freshly hand-pounded rice is used, and in the towns undermilled rice is usually eaten. Under normal circumstances the rice mills only mill up to immediate requirements, and the rice is not usually stored for long in the milled state.

(b) Mahomedan dietaries, taken from town figures, are somewhat similar to Burmese, but are slightly less in their quantities of food-stuffs other than rice. Special enquiries have not been made into diets of Mahomedan coolie gangs.

(c) The diet of vegetarian Hindus is similar to that of the same class in India, and shows the use of considerable quantities of atta as well as the use of milk and milk products. The use of atta will be of value in replacement of any vitamin deficiency in the rice used.

(d) The meat-eating Hindus form a large class with somewhat varied diet habits. Their dietary is distinctly

inferior to that of Burmans, and in the case of certain groups is extremely badly balanced. Large groups of Indian immigrant coolies, chiefly Hindus from Madras Presidency working in the larger coastal towns, consume large quantities of rice, frequently 2½ lbs. a day, and use extremely small quantities of any supplementary articles of food.

3. The outstanding feature of beri-beri in Burma is its incidence amongst the Hindu labourers in the larger towns, large groups of whom use an almost exclusive rice diet.

4. The outbreaks under the special circumstances mentioned in 1 (c), the records of which have been examined or in which investigations have been made, appear to be associated with two factors which prevail in varying degrees. These are (a) a diet consisting largely of rice, with a minimum amount of other food-stuffs; and (b) conditions favouring the deterioration of rice which occurs readily when rice is stored in the husked state in the damp conditions of the monsoon in Burma.

5. There is a definite seasonal prevalence of beri-beri in Burma, commencing about two months after establishment of the monsoon, reaching its height about October, and diminishing during the cold weather months.

6. The deterioration of rice from damp and moulds appears to be a very important factor in the outbreaks which we have had an opportunity of investigating. It is not possible to form a definite opinion on the evidence obtained as to whether the production of any toxic substance in the rice may influence the occurrence of beri-beri, or whether the necessary washing of the friable mouldy rice to make it fit for consumption results in such loss of the outer layers of the grain as will materially reduce its vitamin content.

7. The varied and generous dietary of the average Burman under normal circumstances would appear to be a very important factor in preventing the occurrence of beri-beri under ordinary town and village conditions.

Monsol.

THERE has been so much discussion in the lay papers recently regarding the newly introduced antiseptic Monsol—(manufactured by the Mond Staffordshire Refining Co., 47, Victoria Street, London, S. W. 1)—that we take the liberty of reproducing the following report on the new preparation from *The Practitioner* of March 1928, p. 207.

Monsol is a germicide derived from the oils produced by the gasification of coal by the Mond Power Gas Process; these oils are fundamentally different from those produced by the ordinary process of coal-gas production. In a series of animal experiments to determine the lethal dose, it was found that while 2.5 c.cm. of lysol was fatal to a rabbit, 15 c.cm. of monsol was not, the assumption being, therefore, that monsol is over six times less poisonous than lysol. Other experiments showed that the tolerance of animals to intravenous injection of monsol was remarkable, no ill-effects following the injection of considerable quantities. As a result of bacteriological experiments, it was found that monsol exerts a selective action on streptococci, an opposite effect to that produced by phenol and by coal-tar antiseptics produced by the ordinary process. As regards irritant properties, that monsol is reasonably non-irritant is shown by the fact that while lysol produces a burning sensation on the delicate skin between the fingers, monsol produces no irritation, and on being applied to the tip of the tongue only a slight stinging sensation is produced. To the practitioner, however, the most important test of every antiseptic is the clinical one, and from this searching test we find that monsol emerges triumphant. We find it to be remarkably penetrating, apparently stimulating phagocytosis, and it promotes the formation of healthy granulation tissue in ulcerative conditions. Upon mucous membrane its action is stimulating yet bland, and it is valuable as a douche, spray or gargle. Internally it appears to be similarly valuable in its antiseptic and non-toxic effects. The mass of

clinical evidence collected from many hundreds of practitioners, which has been submitted to us, agrees with these observations, and speaks volumes for the value of this new germicide. Monsol is obtainable as monsol liquid, which forms an instant bland emulsion on being added to water, as monsol ointment, as monsol capsules, for internal administration including asepsis of the lower alimentary tract and the urinary tract, and as monsol pastilles, which have been especially designed to ensure slow solution in the mouth.

Injection of Cerebro-spinal Fluid in the Treatment of Tetanus.

THE treatment of tetanus is so difficult in India, and the specific antiserum either so difficult to obtain or impossibly expensive, that our readers may be interested in the following note from *The Practitioner* of March 1928, p. 206.

G. Spanyi records his experience of withdrawal of cerebro-spinal fluid in tetanus and its re-injection subcutaneously. He advises this method of treatment as an adjunct to the administration of anti-tetanic serum, basing his opinion on a series of ten cases of tetanus treated in this way. Five to 10 c.cm. of cerebro-spinal fluid were withdrawn in each case and re-injected into the skin of the thigh or the abdominal wall. Of these cases seven, or 70 per cent., recovered, whilst in twenty-seven other cases treated by serum alone the recoveries numbered twelve, or only 44 per cent.—(*Schweizerische Medizinische Wochenschrift*, October 29, 1927, p. 1047.)

The Metadysentery Bacilli.

THE work of a pioneer is always of interest, and in the extremely difficult field of the bacteriological study of those bacillary strains of organisms which are apparently associated with dysentery and possibly pathogenic, but which do not conform to the tests for the true dysentery bacilli, Sir Aldo Castellani has always been a pioneer. In a recent paper in the *Journal of Tropical Medicine and Hygiene* (15th November, 1927, p. 285), he presents what is at least a preliminary proposed classification of this very difficult group of bacteria. The paper contains tables of the sugar and other reactions of the different types which will be of great interest to laboratory workers in general. Dividing the strains isolated into two main sub-tribes, viz., those which do not produce gas in glucose or any other sugar, and those which produce gas in glucose and in most other sugars, he identifies six genera in the first and five genera in the second—and proceeds to give the points of identification of the eleven genera concerned, based upon their reactions in milk, lactose, and glucose media. One important lesson in the paper is that, when such organisms are pathogenic, the patient's serum usually agglutinates to them in a high titre. In such cases treatment with an autogenous vaccine often completely clears up the symptoms present.

In his conclusions, the author writes as follows:—

(1) There are several clinical conditions in which organisms of the *metadysentery group* (*Lankoides-Dysenteroides* group) have been found. These conditions may be acute, subacute, or chronic. There may be dysenteric diarrhoea or there may be simple diarrhoea. In certain cases fever may be present and may be a prominent symptom, so much so that some form of enteric or para-enteric may be suspected.

In this paper I have called attention to a chronic type of colitis characterized by recurrent attacks of diarrhoea, generally simple diarrhoea, but occasionally dysenteric for brief periods of time. Between the attacks the symptoms are somewhat indefinite and obscure. The patient feels tired, disinclined for work, nervy, and often complains of slight abdominal discomfort and

flatulency. The symptoms are so indefinite that very different diagnoses are made: intestinal intoxication, intestinal subinfection, mucous colitis, abdominal neurasthenia; not rarely a typical appendicitis is suspected and an operation is performed.

(2) The metadysentery bacilli are intestinal bacilli similar to the dysentery bacilli Shiga and Flexner with regard to certain characters, viz., they do not produce gas in any sugar; they differ, however, from them as they either clot milk and produce acidity in lactose, or they clot milk without producing distinct acidity in lactose, or they produce acidity in lactose without clotting milk. Some species of the so-called metadysentery bacilli group (*Lankoides-Dysenteroides* group) are pathogenic, others probably are not. The two principal species I found in 1905 and published in 1907 and 1908, viz., *B. ceylonensis* B and *B. ceylonensis* A, are, in all probability, pathogenic, and so is the *Bacillus metadysentericus* described by me. In the chronic conditions I have discussed, the blood of the patient generally contains a large amount of agglutinins for the variety of metadysentery bacillus isolated from the patient's stools, as well as the same variety isolated from other patients with the same symptoms. In one of the recent cases three varieties of *Lankoides* were isolated from the stools—two (*B. ceylonensis* B and *B. ceylonensis* A) were agglutinated equally well by the patient's blood, and the agglutinins were specific; the third variety, a strain of *B. madampensis*, was not agglutinated, and was probably non-pathogenic. This case was probably one of mixed infection caused by a strain of *B. ceylonensis* B + *B. ceylonensis* A of the metadysentery group.

I shall be pleased to supply workers interested in the subject with cultures of *B. ceylonensis* B, *B. ceylonensis* A, and certain strains of *B. metadysentericus*.

ESSAY REVIEW.

MALARIA INVESTIGATIONS BY THE DEPARTMENT OF PUBLIC HEALTH, BENGAL.

(i) Report of the Malaria Survey of the Jalpaiguri Duars (1926). [Official.] By S. N. Sur & M. O. T. Iyengar.

(ii) Report on the Malaria Survey of the Environs of Calcutta (1928). [Re. 1-6-0.] By M. O. T. Iyengar.

(iii) Report of the Field Malaria Observatory at Sonarpur during 1921—1925 (1928). [Official.] By M. O. T. Iyengar & P. Sur.

THE Director of the Central Malaria Organization once told the writer that, in his enquiries into the existing literature on malaria in India, he was extraordinarily impressed with the amount of work which at one time or another had been done, and which was largely buried in official reports in various offices, many of them only in manuscript form, which, if more widely known, would help to remove a somewhat widespread extra-India opinion that in this country comparatively little has been accomplished in connection with the study of the most important disease of the Empire. Though it has not been the fate of the three

reports here dealt with to blush unseen in manuscript, none the less, seeing that two of them are "for official use only," they will probably be far less widely read than they deserve, unless, as is hoped, this article draws the attention of malariologists all over the world to their detailed study. For detailed study they are well worth.

In (i), Dr. Sur and Mr. Iyengar deal with the disease in a group of tea estates in the Himalayan foothills. The paper should be read in juxtaposition to Dr. Strickland's recent report on malaria in Assam, recently reviewed in these columns by the present writer, and bearing in mind descriptions of estate-malaria in somewhat similar terrain in Malaya and in Ceylon by Sir Malcolm Watson and the present writer, respectively. In all cases the same species are incriminated as carriers, namely *A. maculatus* and *A. funestus*, by whatever of its varietal names the latter may be known locally, and the present report emphasises, more clearly than anything we have yet read, the disappointment and waste of money that can result from trifling with the control of these species. At Meenglas Estate, the Public Works Department worked on an *obiter dicta* of Sir Malcolm's, that the abolition of anopheline breeding within a 20-chain radius circle would abolish malaria from a spot in the centre. They would therefore appear to have drawn a mathematical circle round the estate tea-factory as a centre, and only attempted control within its perimeter. Now in such relatively minute distances as 20 chains nothing must be left to chance, and it is obvious to anyone having experience of tea estates that if the centre of the circle was the factory, the coolie lines, the protection of which was the desideratum, would be some distance out along various radii from the factory centre. It does not need the disheartening mathematical theorizing quoted to realize that a failure must be the result. The correct application of Sir Malcolm's thesis would in any case result in the protection of an ellipsoid, whose foci would lie at the two most distant points of the blocks of coolie lines. Again, I think that a moment's consideration would have shown that the Malayan thesis was not strictly applicable. Malaya grows rubber, not tea, and a rubber estate resembles a block of pure forest devoid of undergrowth, with all the flight impediment that forest is known to give. Such is absent from the low growing bushes of a tea estate, even if, as is possibly the case at Meenglas, there is a spare admixture of various shade trees among the tea.

We then learn that on failure of the theoretical scheme to provide protection, the area treated was extended to the whole garden. Unfortunately the sketch-map accompanying the report has no scale attached, but from

the description of Lower Fagoo Estate also appearing in the map, Meenglas only appears to be about half a mile broad in all, by one and a quarter miles long, so it is obvious that, even if the factory lines are situated at about the actual centre of the estate, the extension of control to the whole garden can only afford 20-chain protection in two directions, even though the other quadrants are protected to twice that distance. The reduction of the spleen-rates experienced after the taking in of the increased area is eloquent, not of the original failure to eliminate mosquitoes by the means adopted, but of the results of too rigid application of a Master's theorem under unsuitable conditions. Only a pedant mind would omit to control a breeding-place because it lies a few yards beyond a rigidly drawn line. The original failure, however, reflects in no way on Sir Malcolm Watson, little indeed on those originally responsible for the idea of control, but solely on the Public Works Department for pedantry, unless, indeed, their defence is that they were conducting a strict experiment to test the Watsonian hypothesis!!

The description of uncontrolled conditions, and their results on the neighbouring estates, which follow, are of extreme interest as illustrating once again the ravages of malaria among estate labour forces, and one wonders at the financial perspicuity of the managements that allow such losses to continue. Surely an annual expenditure of Re. 1 per head (which is all that was required at Meenglas) is justified to eliminate malaria.

A final, most interesting point, brought out by examination of the working of the original scheme, is that control cannot be brought about by an automatic flushing arrangement designed to reproduce a rainfall spate. The writer had more than once thought of trying out such an arrangement for himself, but finds here the experiment already done for him.

(ii) Extremely interesting as are the facts elucidated and tabulated in this paper, one is only left in the dark as to any explanation of the reasons underlying these. In respect of its primary object, the discovery of areas suitable from the health viewpoint for extensions of the city of Calcutta, the report is satisfactory, inasmuch as it indicates where such healthy areas are to be found, and as equally unsatisfactory, inasmuch as it shows that such healthy areas are invariably so lowlying as to be entirely unsuitable for residential purposes, and one wonders whether reclamation, to raise levels and provide approach roads, might not easily alter the sanitary status of the selected sites. But, on the scientific side, the mechanism governing the extremely patchy distribution of malaria is barely hinted at. There are

references to "dead rivers," etc., but out of the mass of detail presented we cannot form a clear mental picture of the essential differences in water lay-out (to coin a phrase), with its attendant differences in anopheline species, that distinguish a malarious from a healthy patch in what, at first sight, appears an almost uniform stretch of country. Mr. Iyengar, as all his other work shows, has an excellent eye for mosquito ecology, and from the material at his disposal in drawing up this report, will, we hope, formulate for us parallel pictures of the water and faunistic differences between, for instance, Sinthi and Naparo villages on the Barrackpore Trunk Road, where, in a few furlongs, the spleen-rate rises from six to seventy-three per cent., or between the absolutely healthy Ghariabad and the contiguous Dattabad, with 16 per cent., in Dum Dum Thana, in respect of which last pair we read that the non-carrying *A. rossi* is the only anopheline found in both villages.

Why, in this country, *A. stephensi* does not, as in the Punjab and elsewhere, spread out from its wells into open waters, and why *A. ludlowi*, known from only twenty miles further down the Delta, does not spread into waters which the present report shows to contain *Enteromorpha*, are not only problems of great scientific interest, but of vital importance in their solution to the continued existence of many of the suburbs of the city, for changes which would bring about such invasions would undoubtedly, create a situation of the most extreme gravity. Lest these changes be inadvertently brought about, we must strongly urge the necessity for, in particular, the discovery of the factor which inhibits the nearer approach of *A. ludlowi* to Calcutta.

(iii) It has seldom been our lot to read a paper on malariology of which we so thoroughly approve. Investigations on a group of villages made, not *pari passu* with an attempt to control malaria, as is too frequently the case, but entirely as a detailed study of the factors governing the uncontrolled incidence of the disease over an extended period, have long been wanted in connection with malaria investigations in India, and we most heartily congratulate Dr. Bentley, the Director of Public Health, who conceived them, and the authors, who carried them out so thoroughly. Even so, one can only regret that the exigencies of printing seem to have prevented the reproduction of the breeding-place maps, and of greater details concerning those breeding-places that have shown a specifically fluctuating Anopheline fauna, in comparison with those in which the species complex has remained constant. The authors most rightly in consequence warn against the

carrying out of anti-anopheline measures on the results of a single survey, as is commonly done, in areas such as Deltaic Bengal. The writer, who two years ago carried out detailed surveys of Santragachi, in similar country west of the Hooghly, repeated his January examination in July, and found, at the second examination, specific changes in the Anopheline fauna of various ponds and tanks sufficient to engender doubt as to the probability of effecting the least improvement in health by dealing only with the proved breeding-places of carrier species, and after reading this report, feels confident that anti-anopheline measures in the Delta must be based on very much more extended surveys (in respect of repetitions in time), than are found sufficient in other types of country.

The report brings out many other most interesting points. The meteorological tables, for instance, show that in the Calcutta district the transmission of malaria is possible right through the year, the minimum fortnightly average being for humidity 73 per cent. and for 8 a.m., dry bulb temperature 66.1°F., but for all that we still see, as is general over the plains of India, the maximum fever incidence in September-November, as in districts where there is no pre-monsoon transmission. This season is that of the close of the period of maximum humidity—(there is no noteworthy temperature difference until near the end of the quarter)—which to the writer's mind indicates that for India the original work of Jancso requires repetition and amplification.

The report briefly mentions a point which also struck the writer during his Santragachi survey previously referred to, that there seems to be an association between *Eichornia crassipes*, the water hyacinth, and *Anopheles funestus*. If this point could be definitely proved, the "lilac devil" would be saddled with responsibility for an even more serious crime than any it is yet convicted of, and the railway and road embankments perhaps released from the rather vague charge now advanced against them. It is a pity that Dr. Strickland's recently published Anopheline survey of Bengal did not touch on this point, which only needs extended observation for its elucidation.

The question of responsibility for transmission in this part of Bengal is gone into, but the results seem to the writer to be inconclusive. The report appears to blame *A. fuliginosus* almost equally with *A. funestus*; though on page 28 the importance of the latter is emphasised.

Chart X, the relationship between the fluctuation in the spleen-rate and the prevalence

of the two carrier species is extremely interesting, but against *fuliginosus* being the principal culprit we see the following facts:—

practically closed down as from 1926. There can be no doubt that it was doing work of particular value to the science of malariaology

1922	Spleen-rate max.	5 months after <i>fuliginosus</i> max.	2 months before <i>funestus</i> max.
1923	do.	4	1 do. after do.
1924	do.	9 } 7 } 4 }	2 do. after do.
1925	do.	3 } 1 }	1 do. before do.

Now from charts X and XI it appears that the date of the spleen-rate maximum is identical with or follows by one month the fever maximum. As the anopheline maximum is recorded on larval examinations—this should mean at most a two months' lag between the maximum of the carrier species and that of the spleen-rate—and on the above figures this incriminates *funestus* in two years out of four, and *fuliginosus* in one year only, leaving the responsibility for the events of 1922 obscure.

In favour of *fuliginosus* being responsible for the start of the spleen-rate rise are the years 1922 and 1923; against it the two which follow. In any case we cannot subscribe to the hypothesis that the late spring rise in spleen-rate is due to general relapses due to the heat of this period, for at Delhi, with far higher temperatures at this time, as we shall show in a forthcoming report, there is no rise in the fever curve at this time of year save in those years in which there are meteorological conditions definitely permitting transmission a month or so earlier. The late spring rise in Bengal appears to us to be definitely a transmission and not a relapse phenomenon. Careful study of chart X, however, shows a small *funestus* maximum every February-March, and in the writer's opinion reveals the culprit throughout the year. In any case, this is an equation with two variables, and in attempting elucidation or control efforts should first be concentrated on the widely spread *funestus*, to see what effect its elimination alone will have, before attempting the very much more difficult problem of the control of the ubiquitous *fuliginosus*.

Chart XIII, the variations in the three species of the parasites, is unfortunately reproduced too small for clarity, but it reveals the singular phenomenon of a double maximum for malignant tertian malaria, in July-August and in October-November. Benign tertian malaria, on the other hand, has a maximum which varies widely in time, and the picture presented is in many ways quite foreign to the ideas conceived from Northern-India investigators.

It is with great regret that we learn from the introduction that the observatory was

as a whole and the Province of Bengal in particular. Enough general investigation had been done to make it apparent what particular problems could next be studied with fair hopes of obtaining definite answers to definite questions, and we would press for its re-opening at the first opportunity.

R. Senior-White.

Reviews.

FIGHTERS OF FATE.—By J. A. Myers. Baltimore: The Williams and Wilkins Co. British Agents: Messrs. Baillière, Tindall and Cox, London, 1927. Pp. xix plus 318. Price, 13s. 6d. net.

THAT genius is often allied to tuberculosis, or even possibly inspired by it, is an old time observation, and in this book the author gives brief bibliographies of twenty-four very eminent persons who were all the subjects of pulmonary tuberculosis. His style is easy and pleasant to read, but this chief purpose is propaganda—of the right order. In former times the tuberculous genius had but a short spell of life ahead of him; his days were numbered; and, often as a result of this knowledge, the lamp of genius burned the more brightly before it flickered and went out. In present days pulmonary tuberculosis, when treated under suitable open air and sanatorium conditions, is an eminently curable disease, or at least the patient can be restored to the prospect of a considerable number of years of useful life. Thus Roger W. Babson, attacked with pulmonary tuberculosis at the age of 27, is to-day one of the foremost business men of the United States; Lawrason Brown, also attacked at about the same age, was recently Vice-President of the American National Tuberculosis Association and has made many notable contributions to the literature upon the disease; Will Irwin, one of America's most prolific writers, after suffering from the disease is a vigorous man of fifty-two, and still in the forefront of the literary world. Perhaps the most notable example is that of Eugene O'Neill, the famous American playwright, beachcomber, labourer, sailorman, ship's stoker, then in a sanatorium suffering from a severe type of the disease, and now celebrated in two hemispheres.

The book is an eminently readable one, and includes a preface by Charles H. Mayo of the Mayo Clinic. The brief bibliographies included show how terrible is the toll which tuberculosis levies on genius. Paganini, Schiller, Bichat, Laennec, Leigh Hunt, Keats, Elizabeth Barrett Browning, St. Francis of Assisi, Chopin, Thoreau, Dostoevsky—whose tragic life is here well outlined—Artemus Ward—who preserved his humour on his death bed—Trudeau, Cecil Rhodes (it is amazing to find him in this collection, and it is amazing to think that Rhodes, who accomplished such tremendous things for the Union of South Africa was

a tuberculous subject), Aubrey Beardsley, Eugene O'Neill, who is still happily with us; it is an impressive list.

The book is certainly one for the medical man not only to read but to put into the hands of his tuberculous patients, for its chief lesson is that the enforced leisure which pulmonary tuberculosis brings about may result in the patient's discovering within himself new vistas of literary or artistic genius and a new outlook on life. "All tuberculosis workers, as well as the patients themselves, cannot but be heartened by the facts included in these various lives."

It only remains to add that the volume is very well got up and printed. It is a mine of bibliographical information and contains numerous good stories. One of the best relates that Artemus Ward, when on his death bed, detested the medicine prescribed for him.

"My dear Tom," said Artemus protestingly, "I can't take that dreadful stuff."

"Come, come," said Robertson, "take it, my dear fellow, just for my sake. You know I would do anything for you."

"Would you?" said Artemus, faintly, grasping Tom's hand.

"I would indeed."

"Then you take it."

We must congratulate both the author and the publishers on this most interesting book.

PHYSICAL DIAGNOSIS.—By W. D. Rose, M.D. Fifth Edition. St. Louis: The C. V. Mosby Co., 1927. Pp. 819, with 310 illustrations and 3 plates in colour. Price, \$10.00.

In the preface to the first edition of this book the author stated that he had in mind the medical student and the general practitioner during the composition of the work; his object was to present the main facts of physical diagnosis in a manner at once concise, succinct and comprehensive without straying into the abstruse and the theoretical. In the present (fifth) edition this point of view has been most admirably maintained.

Considerably more than one half of the book is devoted to the physical examination of the broncho-pulmonary and circulatory systems, both in health and in disease. The remainder deals with the abdomen, the head and neck, and the extremities, together with a short description of the examination of the nervous system.

Our attention was particularly held by the sections on the heart and lungs, and the author's treatment of these is among the best we have encountered. The clear and logical style, together with the abundant use of excellent photographs and diagrams gives the reader a firm grasp of the activities of these organs, both physiological and pathological. There is a most happy compromise between the somewhat disjointed style of the average "synopsis" and the laboured gait of certain of the larger "systems."

The work is gratefully free of errors. *Auriculve-tricular* on p. 353 line 18 is obviously a slip in typing. The photographs, printing and illustrations are in keeping with the best traditions of the publishers. We unreservedly recommend this volume to all students of medicine—undergraduates and practitioners alike.

J. M. H.

THE HEART AND ITS DISEASES.—By Charles W. Chapman, M.D. (Durh.), M.R.C.P. (Lond.). Edinburgh: E. & S. Livingstone, 1927. Pp. 216. Price, 8s. 6d. net.

The author has tried to summarise well-established facts and recognised theories in connection with the diseases of heart in the light of an extended experience. Special attention has been given to heart-disease in children regarding education and games. The book will be most useful to general practitioners who have no time to refer to the more complete treatises on the subject.

S. P. B.

THE DISEASES OF INFANTS AND CHILDREN.—By J. P. Grozer Griffith, M.D., Ph.D. and A. Graeme Mitchell, M.D. Second Edition. London and Philadelphia: W. B. Saunders Company, Limited, 1927. Two Volumes. Pp. 1715, with 461 illustrations, including 20 coloured plates. Price per set, 90s. net.

THE authors have described in these two volumes the subject of medical pediatrics as exhaustively as possible, without attempting to make it encyclopædic. The subjects of surgery and other special branches with which physicians should be familiar in treating diseases of children have been included. Very valuable are the footnote references to original literature throughout the book. Temperature charts, photographic and other illustrations have been reproduced freely, accompanied by brief notes of the histories of the cases. We are sorry to note the exclusion of some of the important tropical diseases in children. For instance there is no mention of such an important disease as infantile beri-beri, and there is only a mere reference to infantile cirrhosis of the liver, which is very prevalent in India. There is no description of infantile kala-azar. The book deals very exhaustively with the diseases of children, other than those found in the tropics. The authors are to be congratulated on bringing out such a complete account of the most important diseases of children. The volumes can be recommended as constituting a very good book of reference.

S. P. B.

THE NORMAL CHEST OF THE ADULT AND THE CHILD.—By J. A. Myers, in collaboration with other authors. London: Baillière, Tindall and Cox, 1927. Pp. 419, with 141 plates and figures in the text. Price, 22s. 6d. net.

THIS is a very handy book describing the developmental anatomy, applied physiology, x-ray and physical findings of the normal thorax. The human body operates in health and disease in accord with immutable laws. When these laws are known, when the factors concerned can be measured, then medicine will be a science. The authors believe that, far off as may be the goal, progress toward it to be made along this line. The book is to be highly recommended to students, as well as to practitioners as its aim is to explain the clinical findings in diseases of the chest in accordance with our present knowledge of the anatomy and physiology of the organs concerned. It is admirably illustrated and printed.

S. P. B.

MODERN ASPECTS OF THE DIAGNOSIS, CLASSIFICATION AND TREATMENT OF TUBERCULOSIS.—By J. A. Myers. London: Baillière, Tindall and Cox, 1927. Pp. xii plus 275, with 54 figures in the text. Price, 25s. net.

IN an introduction to this volume which is written by a medical friend of the author the reason for adding yet another book to the literature of tuberculosis is given. The author is pre-eminently a teacher, and he has sought to produce a work which will give the doctor and medical student a clear idea of the diagnosis and treatment of this difficult disease. Too often tuberculosis is left to specialists, but until the ordinary practitioner is familiar with the earliest signs and symptoms these will pass unnoticed and the patient will have reached the more advanced and less remediable stages before effective means are taken. The author was formerly a teacher of anatomy and it is from the teacher's point of view that he approaches the subject, though he is able to draw upon wide personal experience.

Practically no new facts are brought forward and quotations are chiefly from the works of American writers; the merits of the book are chiefly the selection and discussion of information useful for ordin-

any practitioners, all points which are not of practical importance being discarded.

E. M.

THE CANCER QUESTION: A REPRODUCTION THEORY.—By W. H. Tomlinson, L.M.S., S.A. London: Baillière, Tindall and Cox, 1927. Pp. 20. Price, 2s. 6d.

THERE are about as many theories about the causation of cancer as there are varieties of malignant growths; but we fear that Mr. Tomlinson's theory is one which is foredoomed to die of inanition from want of evidence. In the first place we are not as pessimistic as he is regarding the value of the research work which is going on in well-organised laboratories on the problem; nor do we agree with his dictum that "the labour of bacteriologists and chemists is so much money and time wasted. It appears like looking in a dark room for a black hat which is not there."

Having reviewed the various views current, the author insists upon four points; that cancer in any one species of vertebrate can only be transplanted into animals of the same species; that it is always at first a local growth, surgically removable; that irritation is a prelude to its development; and that its malignancy is due to the uncontrolled reproductive activity of the cancer cells. He then compares the cancer cell with the ovum; points out that in pregnancy abortion may result from chronic lead poisoning, whilst cancer is being successfully treated by lead salts; and on this extremely slender basis of evidence concludes that the cancer cell results from the union of male and female cells of the tissue concerned under the stimulus of irritation.

We fear that no one will ever discover these male and female cells in somatic tissues, whilst the author singularly fails to supply any evidence that somatic cells possess sex. If he could bring forward evidence of reduction of chromosomes in their cell division, or of the actual occurrence of syngamy in somatic cells, his theory might be worth attention. As it is, it seems to be but little more than an inferior variation of Cohnheim's well-known theory associating cancer with embryonic cell rests.

The book is admirably printed and bound, but the author's excessive use of capital letters is rather deplorable.

ON ROUS, LEUCOTIC, AND ALLIED TUMOURS IN THE FOWL: A STUDY IN MALIGNANCY.—By J. P. McGowan, M.A., B.Sc., M.D. London: H. K. Lewis & Co., Ltd., 1928. Pp. vii plus 99, with 21 illustrations. Price, 10s. net.

THIS study in malignancy is interesting, both on account of the records of the author's careful observations and of his guarded conclusions.

The main portion, preceded by a short chapter on blood cell origins and nomenclature, deals with Rous and leucotic tumours in fowls.

This is followed by a record of observations on the occurrence of melanomata in fowls, and from them the conclusions drawn are that two types arise—mesoblastic and epithelial.

He considers that the melanogen which gives rise to the melanin in these cases is derived from a "melanogenic lipo-protein complex" probably produced in the liver, and that in its distribution the sympathetic and the suprarenal play an important rôle. He refrains from applying these conclusions to melanomata as encountered in man. Further discussions are on the rôle of the lymphocyte in avian pathology, and on the ætiology of tumours.

He characterises the agent concerned in the causation of Rous tumours in fowls as a "stimulin" produced by cells in "reticulo-endothelial areas" throughout the body, and agrees with Carrel that it is not a multiplying particulate virus.

This work should be read by those interested in neoplastic diseases from the points of view of diag-

nosis and ætiology, and also by those who have studied wandering cells in general, and their lineages.

G. S.

THE NORMAL DIET.—By W. D. Sansum, M.S., M.D., F.A.C.P. Second Edition. St. Louis: The C. V. Mosby Co., 1927. Pp. 136. Price, \$1.50.

At the first glance one is inclined to regard this little volume as being suitable only for Americans, as the numerous dietaries which are detailed appeal chiefly to our friends on the other side of the Atlantic. There is another aspect of the book however; it gives a brief but exceedingly sound review of the essentials of a good diet. Each constituent is discussed and the reasons for its necessity are clearly stated. Rather unusually, the vitamins are relegated to a place low down on the list: probably this procedure is justified as very few modern European diets are deficient in any of the vitamins and it would indeed be difficult to devise a diet which is satisfactory in other essential respects, but defective in vitamin content only. For those who have occasion to give advice to European patients this little book will be found very useful.

J. W. D. M.

BAILLIÈRE'S SYNTHETIC ANATOMY: A SERIES OF DRAWINGS ON TRANSPARENT SHEETS FOR FACILITATING THE RECONSTRUCTION OF MENTAL PICTURES OF THE HUMAN BODY.—By J. E. Cheesman. Part IX. The Head and Neck. 12 Plates. London: Baillière, Tindall and Cox, 1928. Price, 2s. 6d. net.

WE would like to draw the special attention of those of our readers who do not know of Baillière's Synthetic Anatomy—both medical students and practitioners—to these splendid issues. The idea underlying them is admirable; for they consist of a series of coloured transparencies, beautifully and most faithfully executed, which can be superimposed one above another to give either the full details of any one or two systems concerned, or a complete presentation of the entire anatomy of the part. Short of a cinema film illustrating the entire dissection of the part concerned, it is difficult to imagine any more illustrative and informative way of instruction; it gives the student what amounts to an ideal dissection of the part for detailed study.

Part IX deals with the difficult subject of the head and neck, and both the author and his publishers are to be congratulated on the exceptionally able way in which this difficult part, in which structures are so crowded, has been dealt with. For example when Plates IV, V and VI are superimposed, a very complete and clear picture of the sub-occipital muscles on their different planes results. We understand that enlarged plates of the pterygo-maxillary region will be ready shortly, and that volumes dealing with the thorax, abdomen, the inferior extremity, and the perineum are in preparation. These—and especially the last, on account of its importance in the teaching of obstetrics—will be eagerly awaited.

The index has been well arranged, as in the previously published parts.

This synthetic anatomy constitutes a new adjunct to the study of human anatomy, and will be found invaluable to the medical student, the practising surgeon, and the specialist. It is a very well conceived work, most admirably executed. The price is extremely moderate.

N. P.

GONOCOCCAL INFECTION IN THE MALE.—By A. L. Wolbarst, M.D., with a chapter by J. E. R. McDonogh, F.R.C.S. St. Louis: The C. V. Mosby Co., 1927. Pp. 237, with 89 illustrations, including 7 colour plates. Price, \$5.50.

THIS book is frankly written for the general practitioner to offer him a working familiarity with the present-day methods of diagnosis and treatment, based mainly on the author's personal views. The anatomical

and pathological aspects of the subject receive in consequence only very brief notice. The sections on diagnosis of the sites of chronic infection are the clearest we have seen anywhere and the plates which show the various glass tests are worthy of careful study. For the treatment of acute gonorrhœa the author is opposed to routine irrigation and prefers treatment by a hand syringe and the newer silver salts. This question was supposed to have been settled many years ago, but there has been a tendency lately to reopen it. All who have treated many cases by urethro-vesical irrigations must have now and again encountered a case where an early and severe posterior urethritis left one uneasily wondering whether the patient would not have fared better with less vigorous treatment. On the other hand the number of untreated or almost untreated cases who do not get complications and appear to rid themselves of all but a trifling secondary infection of the prostate must be very great. The question is one that could be best decided by a large scale investigation in army hospitals. The author is hopeful for the future of the new methods of treatment by intravenous therapy which are still on trial; he omits to give the dosage of mercurochrome, a point on which some discussion, has lately centred. The sections on the use of the posterior urethroscope are full and profusely illustrated from original sources, more so than is usual even in works written for specialists. Even if one does not find anything new in the way of treatment, the sections furnish most instructive reading. Diathermy is put in its proper place as a most valuable adjuvant means of treatment in the complications, depending for its good effect on its indirect action rather than on direct lethal action on the organisms. The author is an enthusiastic advocate of Belfield's operation of vasotomy for chronic spermatoecystitis and claims that massage, etc., rarely brings about a cure. It will be evident that the book deals dogmatically with many controversial matters and we doubt whether the methods advocated are always the best, especially for the general practitioner for whom the book is intended. Still it is a good book which we can recommend to all practising in this field of work, its outlook is unconventional, and the treatment of the subject is strictly scientific.

W. L. H.

THE EXTRA-OCULAR MUSCLES: A CLINICAL STUDY OF NORMAL AND ABNORMAL OCULAR MOTILITY.—By Luther C. Peter, A.M., M.D., Sc.D. Philadelphia: Lea and Febiger, 1927. Pp. 294, with 98 illustrations and 5 coloured plates. Price, \$4.

THIS volume is in an amplified form the substance of the lectures delivered by the author to his class in the University of Pennsylvania, and deals in a very readable way with this very troublesome subject. It gives a really good and accurate account of the anatomy and physiology of the muscles and their innervations, the anatomical description being largely based, as the author acknowledges, on Whitnall's well-known book *Anatomy of the Orbit*; and then goes on to the consideration of the heterophorias, squints, conjugate paralyse and nystagmus, all in due course well and clearly put; the diagnosis and treatment of the heterophorias being particularly good and clear.

The really good points of the book in one's opinion are, the clearness and accuracy of its expression, the omission of a considerable amount of more or less irrelevant detail both in anatomy and clinical tests, and its clearness and helpfulness in applying practical methods of treatment to the pathological conditions described, obviously the result of a large experience in teaching and practice on the part of the author. The get up of the book is good, and it can be strongly recommended as a readable and practical guide to the modern theory and practice of this phase of medicine.

W. V. C.

AIDS TO OPHTHALMOLOGY.—By N. Bishop Harman. London: Baillière, Tindall and Cox, 1928. Pp. viii plus 236, with 112 figures. Price, 3s. 6d. net.

THIS well known old "Aid," now in its 7th edition, presents little change from the last though it has been revised, and the chapter on glaucoma much enlarged, and a new chapter on the "Blind" added which contains some very interesting points. The short notes on "Examination of the Eye" and "Refraction" are good, and better put from a practical point of view than in many of the larger textbooks, the examples of refraction cases being especially useful. The treatments suggested differ in many ways from those in use in India for similar conditions, but are useful and sound, and the book is quite a useful one for those for whom it is intended. Students going up for their examinations in this subject will find it useful.

W. V. C.

DICTIONARY OF BACTERIOLOGICAL EQUIVALENTS.—By W. Partridge, F.I.C. London: Baillière, Tindall and Cox, 1927. Pp. xii plus 141. Price, 10s. 6d. net.

THIS little work will be found useful to laboratory workers and librarians. It contains the English equivalents of about 2,400 French words, 2,600 German words, 1,200 Italian words, and 1,600 Spanish words, in connection chiefly with the science of bacteriology; and is intended to supplement general dictionaries. There is a particular need for this class of small technical language dictionaries, for the medical and laboratory worker will frequently fail to find translations of technical and scientific words in general dictionaries. The book is well printed and got up.

FIRST AID FOR INDIA.—By Major Hassan Suhrawardy, O.B.E., M.D., F.R.C.S.I., I.T.F., Med. Corps. Second Edition, 1927. Pp. 339, with 89 figures. Price, Rs. 1.

WE have previously had the pleasure of reviewing the first edition of this excellent little book. It is well, clearly, and simply written, and one cannot but feel that, as it is especially written with reference to Indian conditions, it is rather more suitable as a textbook for first aid classes in this country than the official British Red Cross textbook which is usually used. Major Suhrawardy has included several matters of specially Indian interest, such as the first aid treatment of snake-bite, of bites from rabid or possibly rabid animals, and of how to put out a blazing sari. The book is well printed and well illustrated, of very convenient size, and well indexed. We can cordially recommend it to our readers.

CATECHISM SERIES. HISTOLOGY. Second Edition. Edinburgh: E. & S. Livingstone, 1927. Pp. 80. Price, 1s. 6d. Postage 2d.

THIS is the second edition of one of the small brochures of the well-known "Catechism Series." It is well put together, clearly printed, and contains a surprisingly large amount of information in a small space. A useful book for the student preparing for his examination, or for reference when looking up a forgotten point in histology.

PRINCIPLES AND PRACTICE OF MOSQUITO CONTROL.—By John F. Marshall, M.A., F.L.S., F.E.S. Hampshire: British Mosquito Control Institute, Hayling Island. Price, 2s. 6d.

THIS little book is in the nature of a guide to the activities and resources of the British Mosquito Control Institute, written by the founder of the Hayling Island Mosquito Control and the Director of the Institute which has grown out of it. It may be interesting in the first place to review briefly the history of the Institution, which has many lessons for rural Bengal and its Anti-malaria Co-operative Societies.

Hayling Island is a high class residential district east of Portsmouth, the residents of which suffered intolerably from mosquito nuisance caused by the European salt-water breeder, *Ochlerotatus detritus*, in company with *Culex pipiens* (first cousin to *C. fatigans*, only too well known to dwellers in the East), and *Theobaldia annulata*. Among the local residents was Mr. J. F. Marshall, a qualified engineer and barrister, with entomological training in addition, who organized a local committee, collected funds from residents, and inaugurated the campaign.

Mr. Marshall proceeded on the soundest lines throughout. A room in his own residence was fitted up as a laboratory, from which a thorough survey of the area was made. To those of us who have to work on topographically unsurveyed ground, using sketch maps, and control large and largely inaccessible perimeters, the details of the survey, and the indicating "washers" (showing the state of each breeding-place at the moment, and the control position, which fig. 5 of the first report illustrates), can only bring a sigh of hopeless envy. Never, in the tropics, can one hope to run a control with so much minute attention to detail. It is a great pity that this figure is not reproduced in the handbook now under review, though the method used is fully described.

Unfortunately we do not possess a complete set of the circulars issued by the Control; the first in our possession being No. 4, giving the results of experimental work on the relative cost of creosol and kerosene as larvicides, invaluable work that had not been done elsewhere. This is summarized in the handbook, and all practising malariologists have cause to thank Mr. Marshall for his investigations.

Work of so thorough a nature can have only one result, success, and we learn from the preface to the handbook, that the long-standing mosquito nuisance at Hayling has been entirely abolished. But, as was inevitable with such work and such a Director, lacuna in our knowledge of mosquito biology became painfully apparent, and research has now come largely to the fore in the work of the Control, so much so that out of the single room in the Director's private residence has grown the entirely new Institute described in the handbook. Illustrated by an admirable set of original photos the reader is taken through the general life-history of mosquitoes, after which the formation and growth of the Institute is described, from which it will be seen (*mirabile dictu* in India), that no Government funds have been utilised, save a single small grant for research purposes only, but that, beyond some limited private subscriptions towards the cost of the original control from local residents, the whole financial burden has been on the back of the Director. When, we wonder, will this country be able to show the like, not only the funds, but the capacity to apply them, in the same individual?

The photos and plans reveal a building admirably suited to its purpose, governed by a council of the highest zoological names in Great Britain, and supported entirely by voluntary subscriptions; there, then follow "Some Practical Details of Mosquito Control Organization," which will be invaluable, especially the illustrations, to all malariologists having to deal with tidal areas; finally records are dealt with, and we can only say that "some day" we hope to have our own department as highly organized!

The book is manifestly designed for the layman and as a means of creating interest and attracting subscriptions, but the professional man can study many parts of it with great profit.

R. S. W.

A TEXTBOOK OF PRACTICAL THERAPEUTICS.—
By Hobart Amary Hare, M.D., LL.D. Twentieth Edition. London: Henry Kimpton. Pp. x plus 1094, with 158 engravings and 8 plates. Price, 38s. net.

THE 20th edition of this very useful and well-known work is very welcome. This volume like the previous

editions is practical in every detail and the author has taken great pains to make the information he gives ready for bedside use. Part I deals with matter introductory to the study of pharmacology and supplies useful information necessary for the practice of rational therapeutics. Part II discusses the pharmacology, toxicity and therapeutics of remedies and briefly but lucidly gives all the information that a general practitioner wants about the drugs he is going to prescribe. Part III contains articles on remedial measures other than drugs and gives an excellent account of foods for the sick and feeding of the sick. In part IV the symptomatology of important diseases and their therapeutics is discussed with full practical details.

This book is the best of its kind and should form a part of the library of every practitioner.

R. N. C.

Annual Reports.

THE 12TH ANNUAL REPORT OF THE BRITISH SOCIAL HYGIENE COUNCIL, JUNE 1ST, 1926, TO MAY 31ST, 1927.

THE aims and object of the Council are succinctly stated in its opening page.

(i) To preserve and strengthen the family as the basic social unit.

(ii) To promote educative and social measures directed towards the development of control of the racial instinct.

(iii) To emphasise the responsibility of the community and the individual for preserving or improving, by educative and social measures, the quality of future generations.

(iv) To further social customs which promote a high and equal standard of sex conduct in men and women.

(v) To promote the prevention and treatment of venereal diseases by appropriate educative, medical and social measures.

(vi) To promote the elimination of commercialised vice.

(vii) To promote the removal of conditions conducive to promiscuity.

(viii) To co-operate with the various organisations interested in the above subjects with a view to co-ordinating efforts to secure these ends.

In view of the Delegation which the Council sent to India last year, the Annual Report will have a greater interest for our readers than usual. It will be remembered that Dr. Lees and Mrs. Neville Rolfe visited India in the cold weather of 1926-27. Their purpose was to investigate roughly the incidence of venereal diseases in India, to explain the seriousness and the crippling effect of these diseases on men, women and children, to explain what was being done to tackle the problem in England by the State, by local bodies and by voluntary agencies like the British Social Hygiene Council, and to suggest what could be done in India by better education of medical men in the diagnosis and treatment of these diseases, by the provision of better facilities for treatment in hospitals and clinics, and by instruction of the general population—to make a beginning in fact of tackling the problem. It must be admitted that apart from conditions in the Army, venereal diseases in India are not properly understood, diagnosed and treated by the great majority of the practising medical profession. Quack remedies are widely and shamelessly advertised in all but the highest class newspapers.

The Delegation, in a short report on Indian conditions, state that they found evidence of a high incidence of syphilis and gonorrhœa in the Provinces and States of India. Social conditions and customs lead to the dissemination of the diseases among the adolescent as well as the adult population. Out-patient treatment in the

large cities has not proved very successful in army province and there is little systematic complete treatment anywhere. The reasons given for failure are lack of trained staff, of suitable premises, and of equipment. The Delegation made recommendations under medical, social and educational heads. Under "medical" they suggest adequate accommodation in hospitals for diagnosis and treatment, ante-natal beds, treatment for children at clinics, more practical teaching to under-graduates and post-graduates, free bacteriological service for practitioners, free supply of drugs to hospitals, and the appointment of a specialist in each province. Under "social and education" they advocate the study of biology by all teachers, instruction of all students in social hygiene, parent conferences, medical inspection of school children, propaganda work amongst the general public, and public enlightenment as regards the effect on the race of commercialised vice and disease. The British Social Hygiene Council offers co-operation in the fulfilment of these aims.

It will be agreed by all who came in contact with the Delegation that their visit to India was stimulating, though it remains to be seen whether the practical results will ensue immediately or later.

It might be as well to state the present position in England. Under the Venereal Disease Regulations of 1916, Local Bodies in England and Wales (and Scotland) must submit to the Ministry of Health a scheme for providing free diagnosis and free treatment to all who may desire such, whether suffering from disease or not, and for the free supply of drugs to selected practitioners. No public money can be spent on schemes not approved by the Ministry, a provision which ensures that only the best of diagnosis and treatment is utilised. Local Bodies may spend public funds on lectures, demonstrations and such propaganda as they wish.

Under the Venereal Disease Act of 1917, where such a scheme is in operation, no unregistered practitioner or quack is allowed to treat venereal disease nor any person advertise any remedy for such disease.

The British Social Hygiene Council is a voluntary organisation which co-operates with the State and the Local Bodies to the full in helping to reach individuals who would not ordinarily take advantage of the treatment and diagnosis centres provided; and by lectures, cinemas and visiting, by co-operating with "parent societies," scout and guide movements, endeavours to disseminate accurate, sane and healthy knowledge about reproduction, and the difficulties and dangers that beset the human race in the conflict of instincts and ideals that civilisation and intelligence have brought to it in its evolution from the purely animal.

The Council's report bears ample evidence of the careful enthusiasm of its members and of its appreciation of the difficulties and possibly the dangers of its activities. One of its most beneficial activities is in the Seaman's Welfare Societies which are being formed all over the world. Responsible countries too long have accepted light-heartedly that a seaman could have a wife (of sorts) in every port and shut their eyes to the misery and the many grim tragedies that followed. It is pleasing to note that all over the world attempts are being made to provide decent homes and decent entertainment, recreation and medical facilities ashore for the mercantile marine of all countries.

We commend the report to all interested in a very important, difficult, and often delicate subject.

A. D. S.

ANNUAL REPORT OF THE UNION MISSION TUBERCULOSIS SANATORIUM, AROGYAVARAM, MADANAPALLE, S. INDIA, FOR 1926-27. BY C. FRIMODT-MÖLLER, M.B., CH.B.,

PERHAPS the brightest feature in the campaign against tuberculosis in India is the wonderful work carried on by the Madanapalle Sanatorium—work with which our readers are already familiar. The Sanatorium is situated in ideal surroundings in a dry and relatively cool climate at an altitude of 2,500 feet above sea-level. It includes more than ninety buildings, and with its

spacious gardens covers more than 100 acres of ground. The atmosphere is entirely free from dust, whilst the surrounding hills protect the site from heavy monsoon storms.

The annual report for 1926-27, as usual, is illustrated with a very fine series of photographs showing the bright, airy and open types of wards, and the new x-ray and laboratory buildings. Dr. Frimodt-Möller has conclusively shown that the results of sanatorium treatment in India are as good as—perhaps even better than—results in Europe. The year opened with 141 patients in residence; 288 were admitted during the year; 278 discharged; leaving 151 patients in residence at the end of the year. The waiting list is a very extensive one, and at one time there were as many as 80 patients on it. The total accommodation, however, has been increased to 176 beds.

Of the patients admitted only 21 per cent. came from the co-operating Missions who are responsible for the upkeep of the Sanatorium; 49.6 per cent. came from districts in the Madras Presidency, and the remainder from other areas all over India; Calcutta, for example, sent 26 patients during the year.

Statistical results are given for 225 patients who were discharged during the year. On admission 23.6 per cent. were in stage I, 32.4 per cent. in stage II, and not less than 44.0 per cent. in stage III—figures which show the general severity of the types of cases admitted. On discharge 74.2 per cent. were discharged with "positive results"—i.e., either arrested, much improved, or improved. Taking stages I and II together, positive results are obtained in some 93 per cent. of cases. "These figures" writes Dr. Frimodt-Möller, "emphasize in the most striking way the very great importance of sending patients for treatment as early as possible." During the last seven years the results of treatment of patients in stage III have improved yearly. This is due chiefly to (i) the introduction of artificial pneumothorax treatment; (ii) the thorough treatment of the different complications due to other diseases; (iii) the longer time the patients are kept under treatment, and (iv) sanocrysin treatment. For 2,027 patients discharged during the twelve years since the Sanatorium opened, the results are as follows:—

	Arrested.	Much Improved.
472 in stage I ..	72 per cent.	18 per cent.
695 in stage II ..	32 per cent.	36 per cent.
860 in stage III ..	1 per cent.	22 per cent.

The bacteriological findings show that tubercle bacilli were detected in 66 per cent. of patients on admission, and had disappeared from the sputum of 40.5 per cent. of patients on discharge. Of stage I cases the bacilli disappeared in 93 per cent. Sixty-three per cent. of patients showed fever on admission, and 59 per cent. of patients discharged were afebrile. The average gain in weight was 11 lbs. Artificial pneumothorax treatment was given in 57 out of the 225 cases; sanocrysin treatment in 49; tuberculin B.E. in 12; and autogenous secondary vaccines in 4 cases. Of important complications *Entamoeba histolytica* infection was present in 35 patients, ankylostomiasis in 45, malarial infection in 69, hæmoptysis in 14, and diabetes in 11. The amount of laboratory work involved during the year was enormous, some 16,000 specimens of different sorts having been examined.

After-history.—Whilst the immediate benefit gained by sanatorium treatment is very marked in the majority of cases, the after-history is a measure of the patient's final resistance to conditions which are frequently only too bad. Poverty is much more acute in India than in the West, and hygienic conditions very much lower. These facts, as also the much greater severity in the types of cases dealt with, must be remembered when comparing after-results in India with those obtained in Europe. It has been possible to trace 679 out of 1,073 persons discharged more than five years previously from the Sanatorium. Of these 53 per cent. were living, and 48 per cent. doing full work five years after discharge. Of stage I patients 89 per cent., of stage II cases 72

per cent. and of stage III cases 70 per cent. of those traced were doing full work. Discharged patients who subsequently die from the disease usually do so within two years of leaving the Sanatorium, whilst of those who are well five years after discharge very few subsequently die of tuberculosis. "Taking all the information obtained about the after-histories of the patients into consideration, it is found that the Sanatorium treatment in India is apparently of equal value to that in the West, and when Indian conditions are borne in mind probably even of greater value."

Other features of the year's work include the special training of doctors, medical students, and laboratory assistants, the publication of papers—two of which appeared in our columns during the year, and the restoration to use of the x-ray apparatus. The new laboratory building provided for by funds collected by the Lee Memorial Mission was completed during the year, and was in charge of the Rev. R. M. Barton, M.A. Two further semi-general wards and two double special wards were added during the year. A medical retreat was held for fifteen doctors employed in mission hospitals in South India. Lantern lectures, cinema shows, and dramatic performances were held, and the annual fancy fair. Miss M. K. Blair, the Matron, reverted to other work after four years of work at Madanapalle, and Miss L. Stanes was appointed Matron from April 1927.

Dr. Frimodt-Møller is to be congratulated on the lead which he has given to India in the sanatorium treatment of pulmonary tuberculosis under Eastern conditions.

ADMINISTRATION REPORT OF THE KING EDWARD VII MEMORIAL HOSPITAL AND THE SETH GORDHANDAS SUNDERDAS MEDICAL COLLEGE, BOMBAY, FOR 1926-27.

THIS report is by Dr. Jivraj N. Mehta, M.D., M.R.C.P. (Lond.), Dean of the College. The combined institution is a new one and much spade work had to be done during the year in equipping and furnishing, drawing up rules and regulations, and making out syllabuses. Permanent affiliation of the College and Hospital to the University of Bombay for the M.B., B.S. degrees was secured in 1926, whilst recognition for post-graduate medical degrees and diplomas has also been secured, and the hospital is now recognised as a training centre for probationer nurses.

The hospital opened the year with 125 beds available, but this number was increased to 267 by the end of the year. Equipment for all the departments continued to arrive during the year, and the x-ray and electro-therapy department, which was the last to be opened, was opened in May 1926. With the opening in December 1926 of the Nowrojee Wadia Maternity Hospital (130 beds) in close proximity, the maternity section of the King Edward VII Hospital was gradually closed down, the students attending the Wadia Hospital; this gave extra accommodation for gynaecological cases and increased the accommodation for children. The ophthalmic department was increased, and it is aimed at a final total accommodation in the hospital of 334 beds. The question of erecting special venereal wards is under consideration.

In-patients admitted during the year numbered 4,378, and out-patients seen 79,823. Operations on in-patients numbered 1,687, and on out-patients 1,106. The recurring expenditure of the year was Rs. 3,41,000. The average cost per out-patient attendance is about Re. 0-7-2, including medicine or dressings, and per in-patient Rs. 3-14-1 per day.

Turning to the report on the college, 183 students were under training during the year, whilst 40 medical graduates were also under training for periods varying from 1 to 8 months. The library constitutes a special difficulty, as the grant is inadequate for the proper provision of books and journals. The Bombay Branch of the Royal Asiatic Society lent a collection of 1,345 old medical books to the library, but, however, interesting

such works, we fear that they do not meet the need for up-to-date textbooks and current journals. Good progress was made with the Pathology and Anatomy Museum during the year, and the Materia Medica Museum is practically complete. The anatomy, physiology and pathology and bacteriology departments are now fairly fully equipped; the hygiene department more or less so; whilst the pharmacological and toxicological sections were only slightly equipped by the end of the year. In addition to routine duties, research work has been carried on on indigenous food-stuffs and several indigenous Indian drugs.

The Students' Hostel was completed in May 1926, and can accommodate 100 students. There is no accommodation for lady students, whilst the existing accommodation is likely to prove inadequate very shortly.

A marked feature of the hospital is that a considerable part of its income is derived from voluntary subscribers, from factory owners, and by way of sickness insurance from factory workers in the Bombay mills. Local philanthropists and others in Europe and America have also endowed beds or wards; and in his concluding paragraph Dr. Mehta pleads with the philanthropists of Bombay for further endowments for research and for medical education.

Correspondence.

WHY ARE WE ONE-SIDED?

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I have to-day read in your current issue the letter of Dr. Janeseli, headed "Why are we one-sided?"

It seems to me that the undoubted fact that most of us use the right side of our bodies more than the left can be traced to force of circumstances. Our aboreal ancestors, for example, were ambidextrous. Anyone who doubts this can resolve his doubts by a visit to the Zoo, or better still to—let us say—the hill station of Matheran.

As man ascended in the evolutionary scale and descended from the comparative security of the trees, he gradually found it necessary to evolve means of protection from his fellows and from other animals, and to invent weapons of an offensive as well as defensive nature. *Si vis pacem, para bellum.*

As man discovered that the dried hides of animals parried the blows of attackers, the shield developed down the centuries from the Stone Age, through the days of "chivalry" to that culminating act of "progress" and "civilization"—the Great War. Meantime, man, the warrior, always on the *qui vive*, carried the shield on his left arm to protect the cardiac area, since instinct and experience, if not post-mortem examinations, had taught him that this was the "vital spot."

The result over centuries of years is the "habit" of one-sidedness. That this habit, even after such long experience, is not congenitally fixed and ingrained can be proved by the most casual observation of a child who uses both hands equally well, or rather equally ill; and who, as he grows older, when—as he does as often as not—he offers his left hand to greet strangers is checked by his nurse or mother. He is taught that it is "wrong"—i.e., impolite—to offer the left hand. Later, he is taught to write, draw, etc., with his right hand only, and the discarded left hand and arm remain clumsy, untrained, undeveloped.

But they can be restored to full utility. The telegraphist, the stenographer suffering from "writer's cramp," can quickly learn to write with the other hand; the man with a whitlow on his right thumb soon realizes that he can button his clothes satisfactorily with the left hand after a few days of awkwardness.

It is too late to cry a halt to this progressive degeneration of an abused—because disabused—extremity, and the corresponding side of the body? Must the left side of

the body go the way of the auricle, the appendix, and the tail? Must man, a million years hence, roam the world a moiety of his former self?

This impending catastrophe can be aborted by teaching the child to be ambidextrous, as Heaven intended him to be. "Bring up the child in the (two-sided) way he should go, and when he is a man he will not depart from it." For, to suggest that the human race is one-sided for any reason other than habit—i.e., certain acts becoming fixed by reiteration in the retentive subconscious mentality—savours of that well-known fallacy in logic, *petitio principii*.—Yours, etc.,

W. NUNAN, M.D.,
L. Police Surgeon.

BOMBAY,
17th February, 1928.

ASPHYXIA NEONATORUM.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Experience has convinced me that the lives of numerous infants are sacrificed in India owing to the neglect by midwives and doctors in attendance to render first aid to apparently breathless infants. Recently I was called upon to attend a Hindu female aged 16 years in her first pregnancy. The membranes had been ruptured long before, the second stage of labour had been unduly prolonged, and the patient was very exhausted. Having adopted the usual antiseptic precautions I delivered the child by forceps under chloroform anaesthesia. It was in a condition of white asphyxia and apparently dead. I placed it in a basin of warm water, and commenced artificial respiration. Not until ten minutes later did the child commence to breathe spontaneously. The child, a female, is to-day, 2½ years later, in good health, and the mother has subsequently given birth to a second, male, child.

In another instance after forceps delivery, an interval of twelve minutes during which artificial respiration in a basinful of warm water was carried out elapsed before the child began to breathe spontaneously.

It is my belief that the medical profession in this country is not sufficiently alive to the possibilities of saving many infants who are born in a condition of white asphyxia, and apparently dead.—Yours, etc.,

L. R. DATTA,
Medical Officer.

RAJOURI DISPENSARY, JAMNU STATE,
2nd December, 1927.

AN ABERRANT CASE OF PLAGUE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case appears to present unusual features:—

Some three days ago I was called in to see a patient who gave a history of continuous fever which had set in suddenly four days previously. Examination showed nothing abnormal except an enlarged spleen, which was just palpable. His mental condition was clear and he did not appear to be in much discomfort. The temperature was stated by the relatives to have been 102.5°F. or lower during the previous three days. I gave him an injection of quinine, though I was not sure that the fever was of malarial origin.

The next day his condition was the same. On the sixth day of the disease three discrete glands near the upper part of the sterno-mastoid muscle on the right side became tender, swollen, and inflamed. The condition of the throat was normal, the patient's temperature only 100°F., and his mental condition clear, and without distress. I accordingly dismissed a diagnosis of plague.

On the seventh day of illness the glands had become matted together into a large tender bubo, and the patient commenced to spit blood in large quantities. He also complained of lancinating pain the left side of the chest, and pleural friction and slight dullness were detected. On sending the sputum to a laboratory for examination, it was reported that *B. pestis* was present in profusion.

Even at this stage, however, the patient's temperature was only 100°F., his mental state clear, and there was no conjunctival congestion.

The case appears to have been an abnormally mild one of plague.—Yours, etc.,

K. V. ADALJA, M.B., B.S.

NAIROBI,
20th February, 1928.

A PRESCRIPTION FOR INTESTINAL COLIC.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The treatment of simple intestinal colic may seem a simple matter, but such cases are perhaps amongst the commonest everyday ones seen in medical practice in this country. In this connection—and especially for intestinal colic in children—I have found the oral administration of a mixture of equal parts of camphor, menthol, and thymol in water to act almost as a specific. The drugs should be given in a maximal doses for the age of the patient concerned.—Yours, etc.,

ANANDLAL BUCH, L.C.P. & S. (Bom.),
Medical Officer.

JAM KALYANPUR DISPENSARY,
JAM KHAMBHALLA,
24th February, 1928.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel H. W. Acton, I.M.S., Professor of Tropical Pathology and Bacteriology, School of Tropical Medicine and Hygiene, Calcutta, is appointed Director of the School in addition to his own duties.

Consequent on the grant of leave to Lieutenant-Colonel J. K. S. Fleming, O.B.E., I.M.S., Lieutenant-Colonel H. E. Stanger-Leathes, I.M.S., Assistant Director of Public Health, Delhi, is appointed to officiate as Deputy Director-General, Indian Medical Service, with effect from the afternoon of the 22nd March, 1928.

Lieutenant-Colonel R. Knowles, I.M.S., Professor of Protozoology, School of Tropical Medicine and Hygiene, Calcutta, was appointed, with effect from the 8th March, 1928, to act as Director of the School in addition to his own duties, *vice* Lieutenant-Colonel A. D. Stewart, I.M.S.

Lieutenant-Colonel A. D. Stewart, I.M.S., Professor of Hygiene, School of Tropical Medicine and Hygiene, Calcutta, was appointed to act as Director of the School in addition to his own duties for the period from the 22nd February to the 7th March, 1928, *vice* Lieutenant-Colonel J. W. D. Megaw, I.M.S.

Lieutenant-Colonel W. V. Coppinger, D.S.O., M.D., F.R.C.S.I., I.M.S., Professor of Ophthalmic Surgery, Medical College, Calcutta, and Ophthalmic Surgeon of the College Hospital, is appointed to officiate as Surgeon-General, Bengal, during the absence of Major-General Tate, on leave.

The services of Lieutenant-Colonel J. M. A. Macmillan, M.D., I.M.S., Civil Surgeon, Simla (East), are replaced at the disposal of the Government of the Central Provinces, with effect from the 1st May, 1928.

Major H. E. Murray, M.D., I.M.S., First Resident Surgeon, Presidency General Hospital, Calcutta, is appointed to act, until further orders, as Surgeon Superintendent of the Hospital, in addition to his duties, *vice* Major Kirwan, transferred.

The services of Lieutenant-Colonel C. H. Reinhold, M.C., I.M.S., are placed at the disposal of the Chief Commissioner, Delhi, with effect from the 22nd April, 1928.

Major L. A. P. Anderson, I.M.S., an officer of the Medical Research Department, is confirmed as Assistant Director, Central Research Institute, Kasauli, with effect from the 4th April, 1928.

The services of Major J. R. D. Webb, O.B.E., D.P.H., I.M.S., are placed temporarily at the disposal of the

Chief Commissioner, Delhi, for appointment as officiating Assistant Director of Public Health, Delhi, *vice* Lieutenant-Colonel H. E. Stanger-Leathes, I.M.S., with effect from the afternoon of the 22nd March, 1928.

Major H. K. Rowntree, M.C., M.B., B.S., I.M.S., is appointed to be Civil Surgeon, Simla (East), with effect from the date on which he assumes charge of his duties.

Major E. W. O'G. Kirwan, M.B., F.R.C.S.I., I.M.S., officiating Surgeon Superintendent, Presidency General Hospital, Calcutta, is appointed to act, until further orders, as Professor of Ophthalmic Surgery, Medical College, Calcutta, and Ophthalmic Surgeon, Medical College Hospital, *vice* Lieutenant-Colonel W. V. Coppinger appointed to act as Surgeon-General, Bengal.

The services of Major M. G. Bhandari, I.M.S., are placed at the disposal of the Government of the Punjab, for employment as Superintendent of the Borstal Institute, Lahore, with effect from the date on which he assumes charge of his duties.

Major C. Newcomb, I.M.S., is placed on foreign service under the Indian Research Fund Association, with effect from the afternoon of the 20th March, 1928, until further orders, for employment on nutritional researches.

The services of Major G. Covell, I.M.S., an officer of the Medical Research Department, are placed temporarily at the disposal of the Government of Bombay, with effect from the afternoon of the 19th March, 1928, to undertake a malaria survey of Bombay city.

On reversion from foreign service under the Governing Body of the School of Tropical Medicine and Hygiene, Calcutta, Captain G. C. Maitra, I.M.S., of the Medical Research Department is appointed to officiate as Assistant Director at the Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

To be Captains.

F. E. B. Manning, 4th August, 1927, with seniority, 3rd April, 1925.

S. Smyth, 4th August, 1927, with seniority. 24th January, 1927.

To be Lieutenants.

J. Quigley, 4th August, 1927, with seniority, 1st September, 1924.

R. A. Haythornthwaite, 4th August, 1927, with seniority, 19th February, 1925.

R. D. Alexander, 21st November, 1927, with seniority. 21st November, 1926.

LEAVE.

Major-General G. Tate, M.B., K.H.S., I.M.S., Surgeon-General with the Government of Bengal, is granted leave on average pay for six months, with effect from the 26th April, 1928, or the date on which he avails himself of the leave.

Lieutenant-Colonel R. McCarrison, C.I.E., M.D., F.R.C.P., I.M.S., an officer of the Medical Research Department, on foreign service, under the Indian Research Fund Association, is granted leave on average pay for eight months, with effect from the date on which he avails himself of the leave. His services are replaced at the disposal of the Director-General, Indian Medical Service, with effect from the date on which he proceeds on leave.

Lieutenant-Colonel Sir F. P. Connor, Kt., D.S.O., F.R.C.S., Professor of Surgery, Medical College, Calcutta, and Surgeon to the College Hospitals, is granted leave from the 28th February, 1928 to the 15th December, 1928.

Lieutenant-Colonel R. Knowles, I.M.S., Professor of Protozoology, School of Tropical Medicine and Hygiene, Calcutta, is allowed leave on average pay for six months, with effect from the 15th July, 1928, or from any subsequent date on which he may avail himself of it, under articles 81 (b) (i) and 82 (b) of the Fundamental Rules.

Major H. Hingston, M.D., I.M.S., Surgeon to His Excellency the Governor of Bengal, is allowed leave on average pay for six months, with effect from the 15th

May, 1928, or from any subsequent date on which he may avail himself of the leave.

Major P. F. Gow, D.S.O., M.B., I.M.S., officiating Professor of Clinical Obstetrics and Gynaecology, Medical College, Calcutta, and Second Surgeon, Eden Hospital, Calcutta, is allowed leave for six months, with effect from the 22nd April, 1928.

Captain L. K. Ledger, I.M.S., an officiating Agency Surgeon, is granted leave on average pay for one month and fourteen days, combined with study leave for seven months and seven days and furlough under Military Rules for three months and ten days, with effect from the 16th February, 1928.

PROMOTIONS.

Lieutenant-Colonels to be Colonels.

John Wallace Dick Megaw, C.I.E., M.B., V.H.S., *vice* Colonel Chintaman Ramchandra Bakhle, K.H.P., retired. Dated 12th February, 1928.

Brevet Colonel William David Acheson Keys, C.I.E., M.D., *vice* Colonel Hamilton Maxwell Cruddas, C.M.G., O.B.E., retired. Dated 11th March, 1928.

Captains to be Majors.

James Edward Ainsley. Dated 29th December, 1927. Robert Ancel Leembruggen. Dated 1st April, 1928.

Lieutenants to be Captains.

K. M. Bharucha, M.B. Dated 13th October, 1926.

J. D. O'Neill, M.B. Dated 22nd December, 1926.

RETIREMENTS.

Lieutenant-Colonel F. F. Elwes, C.I.E., M.D., retires 28th February, 1928.

The King has approved the retirement from service of Colonel H. M. Cruddas, C.M.G., O.B.E., I.M.S., with effect from the 11th March, 1928.

NOTES.

D. T. M. (Bengal), 1928.

At the examination at the Calcutta School of Tropical Medicine in April 1928 for the Diploma in Tropical Medicine of the Faculty of Tropical Medicine, Bengal, the following 23 out of 31 candidates passed:—

Passed with Distinction.

1. Muralimohan Roy, M.B., Assistant Surgeon, Government of Bihar and Orissa.

Passed.

- (Arranged in alphabetical order.)
2. Bantval Subraya Baliga, I.M. & S., Agricultural District Health Officer, Government of Madras.
3. Ditis Chandra Bhattacharyya, M.B., Private Medical Practitioner.
4. Pulin Behari Bhattacharya, M.B., Honorary Assistant Emergency Officer in Medical College Hospital, Calcutta.
5. Sailendranath Chattopadhyaya, M.B., Private Medical Practitioner.
6. Rajani Mohan Das, M.B., Civil Assistant Surgeon, Government of Assam.
7. Henry Thomas Eling, I.M.D., Assistant Surgeon in the Indian Medical Department.
8. Sourendra Nath Ghosh, I.M.S., D.P.H., District Health Officer, Corporation of Calcutta.
9. Krishnaji Mahadeo Godbole, M.B., B.S., Assistant Surgeon, Government of C. P.
10. Ramachandra Subharama Iyer, M.B., B.S., Assistant Surgeon, Government of Madras.
11. Mandalam Sivaramiah Lakshmanan, I.M.S., District Health Officer, Government of Madras.
12. Jogendra Nath Maitra, M.B., Private Medical Practitioner.
13. Vadakkie Kurupath Kochukrishna Menon, M.B., B.S., Assistant Surgeon, Government of Madras.

14. Grace Helen Newell, M.B., B.S. (Lond.), Medical Officer, Baptist Mission Hospital, Ganjam.
15. Ram Rakha, L.M.P., Sub-Assistant Surgeon, Indian Medical Department.
16. Ramaprasanna Roy, L.M.P., Sub-Assistant Surgeon, Government of Bengal.
17. Madan Mohan Saha, M.B., Private Medical Practitioner.
18. Mrityunjoy Sen, M.B., Private Medical Practitioner.
19. Ranajit Kumar Sen Gupta, M.B., Private Medical Practitioner.
20. William Harden Smith, M.B., B.Ch., D.P.H., Sanitary Officer in the Zanzibar Protectorate.
21. James Herbert Theodore, L.M.D., Assistant Surgeon, Government of Madras.
22. Krishnasamiar Viswanathan, L.M.S., Municipal Health Officer, Government of Madras.
23. Patrick Wolfe, L.M.D., Assistant Surgeon, Indian Medical Department.

BOMBAY MEDICAL COUNCIL.

THE following summary of the proceedings of the Bombay Medical Council held on the 17th October 1927 is published in the medical press for information.

The Council considered the case of Navroji Ardeshir Cooper, M.D., B.H., who had been summoned to appear before the Council on the following charges:—

(1) That in the breach of rule 22 of the Code of Medical Ethics issued by the Bombay Medical Council he displays outside the premises in which he carries on practice on Hornby Road, Bombay, signboards exhibiting the following words:—

(a) Laboratory and Vaccine Institute. Blood, Sugar-Test and Examination of Urine, Sputum, Blood, etc.

(b) 606 Clinic.

Thereby advertising that he adopts in the treatment of certain diseases special lines of treatment;

(2) That in breach of rule 22 of the Code of Medical Ethics issued by the Bombay Medical Council he displays outside the said premises three signboards;

(3) That in breach of rule 22 of the said Code of Medical Ethics he displays signboards of unnecessarily large size;

And that in relation to the said charges he has been guilty of infamous conduct in a professional respect.

The Council held charges (1) and (2) to have been proved to the satisfaction of the Council. The judgment of the Council stands postponed to the next meeting.

The Council considered an application from Mr. V. R. Kane, L.C.P.S., to permit the registration of the qualification of L.M. (Dublin) which is granted by the Coombe's Hospital, Dublin, and signifies Licentiate of Midwifery. The Council decided that as the qualification in question is not registrable in the United Kingdom, it should not be accepted for registration in Bombay, Mr. Benjamin dissenting.

The Council considered an application from the Mysore University (forwarded through the Resident in Mysore and the Government of Bombay) for recognition of the L.M.P. examination of that University. The Council resolved to inform Government that in view of the communication made to the Hyderabad (Deccan) Medical School by the Government of India, it appears that if an Institution not mentioned in the Schedule of the Indian Medical Degrees Act desires to have its diploma recognised, it should be affiliated to one of the Institutions mentioned in the Schedule of the Act, and that as the Mysore University is not so affiliated, it does not seem that the Council has authority to consider the propriety of including the qualifications granted by that University in the Schedule of the Bombay Medical Act.

An application for registration under section 7 (3) of the Bombay Medical Act received from Mr. H. S. Barker who obtained his certificate of qualification from

the Miraj Medical School in 1903 was considered, and the Bombay Government were informed that in the opinion of the Council Mr. Barker may be given the permission applied for.

An application for registration under section 7 (3) of the Bombay Medical Act received from Mr. V. G. Chakradeo, Licentiate of the College of Physicians and Surgeons of Calcutta, was considered, and the Bombay Government were informed that as the applicant was not practising medicine in the Bombay Presidency before the 25th June 1912, he cannot get the benefit of section 7 (3) of the Act.

The Council considered an application from Mr. R. E. Kamat, L.C.P.S., for the restoration of his name to the Medical Register whence it was removed under section 6 of the Bombay Medical Act, and resolved not to restore his name for the present.

On consideration of a letter received from Mr. Roze F. Castellino, L.M.S., the Council resolved that in the case of general practitioners the use of the words "Physician and Surgeon" may be allowed after their names, and that rule 22 of the Code of Medical Ethics be amended accordingly.

The Council considered a letter from Mr. P. K. Jandani, a registered medical practitioner of Sind, claiming a fee for giving a medical certificate in a medico-legal case, at the request of the police, and resolved that the papers be sent to Government with a recommendation that in view of the fact that the practitioner granted the certificate at the request of the police, he is entitled to a fee.

On consideration of certain particulars in connection with the recent election of members to the Bombay Medical Council, which the Registrar brought to their notice, the Council laid it down that every elector should send his voting papers in future in a separate cover.

BOMBAY MEDICAL COUNCIL.

The following summary of the proceedings of the Bombay Medical Council held on the 6th February 1928 is published in the Medical Press for information.

(1) The Council resumed consideration of the case of Dr. N. A. Cooper, M.D., B.H., judgment in which had been suspended on the two charges proved against him to the satisfaction of the Council, viz.,

(a) That in the breach of rule 22 of the Code of Medical Ethics issued by the Bombay Medical Council he displays outside the premises in which he carries on practice on Hornby Road, Bombay, signboards exhibiting the following words:—

(i) Laboratory and Vaccine Institute, Blood, Sugar-Test and Examination of Urine, Sputum, Blood, etc.,

(ii) 606 Clinic.

Thereby advertising that he adopts in the treatment of certain diseases special lines of treatment;

(b) That in breach of rule 22 of the Code of Medical Ethics issued by the Bombay Medical Council he displays outside the said premises three signboards.

The Council resolved to further postpone their judgment till the next meeting.

(2) The Council considered the case of Charles Charity Raymond de Souza, M.B., B.S. (Bom.), who had been summoned to appear before the Council on the following charges:—

(a) That in or about May 1925 in Africa he advertised by means of visiting cards upon which he described himself as "Dr. C. C. Raymond, Director, the Neucuro Propaganda for Africa."

(b) That in or about May 1925 in Africa he acted as Agent for a patent medicine called Neucuro and distributed literature or pamphlets extolling the virtues of the said patent medicine.

The Council judged Charles Charity Raymond de Souza to have been guilty of infamous conduct in a professional respect and directed the Registrar to erase his name from the Bombay Medical Register.

(3) The Council considered an application from Dr. V. S. Gupte, M.D., of the University of Minnesota, U. S. America, and other papers and correspondence relating to the same. It was resolved "that the curricula of the M.B.B.S. of the Bombay University and of the

Membership of the College of Physicians and Surgeons of Bombay should be communicated to the Medical Board of the United States of America (through the American Consul in Bombay) with a request that they will state if the Medical Board of the United States of America will permit Graduates and Members of the above two Institutions to appear directly for the State Examinations to practise, on the same terms as those who have obtained their degrees from the "A" class Allopathic Institutions of the U. S. A., to enable the Bombay Medical Council to consider the application for registration from a M.D. of the University of Minnesota and other "A" class Universities and the question of reciprocity between the Bombay Medical Council and such Universities."

(4) The Council considered a reference from the Surgeon-General with the Government of Bombay forwarding, for the remarks of the Council, a memorandum from the Commissioner in Sind in which the question is raised as to the maximum dose of morphia that a medical practitioner should prescribe. The Council resolved to inform the Surgeon-General that the Council discourage large doses of morphia being prescribed by medical practitioners but that in special cases they are allowed to exercise their judgment for the welfare of the patients; that any case of abuse of the drug by a registered medical practitioner can be dealt with by the Council if a complaint is lodged in the matter; and that under the circumstances it is not necessary to impose any limitation under the rules.

BRITISH INDUSTRIES FAIR.

LONDON, FEB. 20 TO MARCH 2, 1928.

An Interesting Vitamin Exhibit.

Among the interesting exhibits displayed by Burroughs Wellcome & Co., at the British Industries Fair was "Tabloid" Irradiated Ergosterol, a product which presents Vitamin D, the anti-rachitic factor of cod-liver oil and certain other fish and animal fats. "Tabloid" Irradiated Ergosterol was shown for the first time by this firm at the British Medical Association Exhibition at Edinburgh in 1927, and it is of interest to recall that the chemically pure ergosterol used by the British Medical Research Council in their experiments in 1925, which resulted in the formation of the Vitamin D principle, was prepared and supplied by Burroughs Wellcome & Co.

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Members of the profession who are accustomed to recognise "Tabloid" products as standards of purity saw them from a new angle—that of space economisers.

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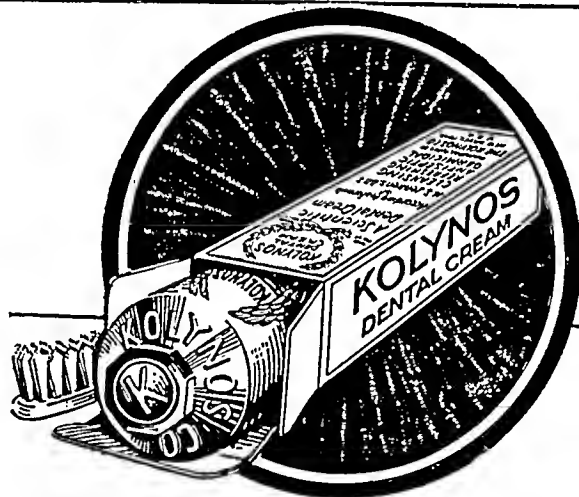
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MAJOR-GENERAL G. TATE, M.D., K.H.S., I.M.S., SURGEON-GENERAL
WITH THE GOVERNMENT OF BENGAL

Far Eastern Association of Tropical Medicine
SEVENTH CONGRESS

3245

9/1/28

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ADDRESS: HEAD OFFICE.

The 7th January, 1928.

Messrs. Bengal Immunity Co., Ltd.,
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Dear Sir,

On behalf of our Local Committee, I beg to thank your firm for their assistance during the Far Eastern Association of Tropical Medicine 7th Congress just concluded. The demonstrations at your laboratories were very much appreciated by the members who attended, who had an opportunity of seeing what local enterprise could do in biological research and production.

Yours faithfully,

(Sd.) G. TATE,

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By V. B. GREEN-ARMYTAGE, M.D., F.R.C.P. (Lond.),
LIEUTENANT-COLONEL, I.M.S.,

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IN view of the fact that throughout the Northern quadrant of India from Peshawar to Calcutta in a thousand townships there are young girls, married women and old ladies suffering from the active disease or some sequelæ of its chronic form, it behoves us to review the clinical aspects of osteomalacia with a view to its modern prevention and treatment. For whereas a few years ago we looked upon this disease as a painful and hopelessly crippling condition, and did not recognise its variegated types, to-day we should be able to diagnose the many diverse clinical forms and definitely state that the disease can be cured or arrested if the proper treatment be carried out.

In order to make the rationale of the modern treatment understood, certain primary facts must be stated, viz:—

1. Any variations from the normal in the blood calcium and phosphorus of osteomalacias depend directly upon the severity of the disease and its duration. The normal percentage of calcium in the blood per 100 c.c. is 10.5 to 11 mgm. and of phosphorus 4 to 5 mgm.

2. Osteomalacia may occur at puberty and resemble late rickets; it may occur in those who have never been pregnant; or occur for the first time in women during or after the menopause. In our experience, the most usual time has been either during lactation or during the third or fourth pregnancy.

3. The menstrual flow in all our non-pregnant patients has been uniformly scanty and irregular.

4. Improving the diet alone in Indian patients has no marked effect on the disease, nor has any benefit been derived from giving any of the derivatives of calcium alone, but if cod-liver oil is added to the diet or given intravenously, there is immediate relief of symptoms:—the hobbling, waddling, groaning cripple in a few weeks walking, sitting or rising without pain.

5. If from poverty or other cause it is not possible to rectify the calcium deficiency in the diet, and yet cod-liver oil is given, exactly the same benefits will accrue. Therefore there must be some element in cod-liver oil which activates the retention of calcium in the system, or which enables the calcium to be utilised, *in the presence of sunlight*.

6. Osteomalacia is a deficiency disease and is to be placed in the same category as rickets; the deficiency principally is in the fat-soluble vitamins A and D, or the calcium activator content of the diet.

7. There is no pathological evidence whatever that the ovaries are in any way connected with the aetiology of osteomalacia. It is difficult to understand how this erroneous idea started and is still held by a few die-hards. Presumably it gained acceptance because castration not only prevented further pregnancy, but also stopped all menstruation with its consequent monthly drain of menstrual calcium.

8. Radiographs have been taken in a great number of our cases. In some, all that was seen was decalcification or blurring of outline. In others there was the typical hony deformity of the pelvis, sternum, vertebrae or long bones. In one Sikh from Burma and in one Bengali there was the anterior beaked pelvis like the prow of a boat. In a great many there was such crumpling of the pelvis as to make the true conjugate or outlet transverse but two inches or less. In Bengal the funnel pelvis is peculiarly common, not only among Indians but also among Anglo-Indians. The greater frequency of this deformity to-day, not only in India but also in Europe, suggests that its causation may be due to mild osteomalacia or food deficiency errors at puberty, for we have observed that in all these cases there is a history of delayed or irregular onset of the menstrual cycle, probably dependent on deficient calcium activation and vitamin shortage, for the vitamins are to the endocrines what the endocrines are to the economy.

Symptoms.

We particularly wish to stress the point that just as rickets is a deficiency disease with multiple clinical types, so is osteomalacia.

In our series of cases such symptoms as tetany, or hyper-irritability of the muscles with exaggerated knee jerks, and in some cases actual paralysis of the extremities were very common.

In other cases still the symptoms were mainly gastric or intestinal, with great distension and inability to digest food. In some of these the anæmia was very great, and girdle pains a marked feature, resembling the gastric crises of locomotor ataxy.

In most cases worms are present, and it would seem as if in addition to a vitamin A and D deficiency, there was a vitamin B shortage as well.

In some tetany and anæmia were practically the only symptoms in the early stages of the disease; later, the patients having been treated for hysteria by their medical attendants, or having developed girdle and shoulder pains, or having complained of pain in rising and sitting, a further opinion was usually sought.

In other cases we found that the patient, being old and past the menopause, had been treated with iodides and salicylates for months

on the plea of rheumatoid arthritis. Many of these were so crippled that they could not stand or walk and had been anchored to one corner of a room for months.

In some there was almost complete paralysis below the waist line after child-birth, and because they had no pain whatever, the diagnosis had been an organic cord lesion. We have seen these patients walking about within a month of efficient treatment. Others only complained of numbness or pain in the extremities, and in some this numbness was associated with a sensation of ants creeping over the skin, particularly in the waist line and lateral parts of the thigh. In two cases this formication symptom was in the shoulder girdle with only stiffness but no pain, suggesting a mild neuritis or vasomotor disturbance.

In a few, face-ache or tooth-ache with neuralgia was the main complaint, beside the anæmia.

Finally, it is *all-important to remember that the typical bony changes such as the triradiate pelvis of the advanced case are by no means a necessity.*

We have seen patients at puberty and after abortion or full term labour where the signs and symptoms were *entirely muscular, nervous, or tetanoid* and in whom all symptoms subsided after correct treatment. An interesting feature of this type of case is that the disease may occur mildly with such like nervous, muscular or tetanoid symptoms and give rise to no obstetric difficulties whatever, and then suddenly in a subsequent conception become acute, with crumpling of the bones and complete immobility, necessitating Cæsarean section or an extraordinarily difficult craniotomy.

One of the tragedies of osteomalacia is or has been that the obstetrician has not realised that the foetus suffers with the mother, and fails to get enough calcium when the mother's blood (starved of its fat-soluble vitamins) is deficient in this mineral. The consequence is that the foetus when born is skinny and its long bones are poor in ostein and chondrin, whilst the epiphyseal zone of calcification is irregular. The tragedy lies in the fact that if the attendants after a normal delivery, or surgeons after a Cæsarean section do not realise this, the infant may rapidly go down hill and die from calcium and vitamin starvation.

It behoves all attendants to remember that both mother and child after delivery require adequate and correct vitamin feeding, for it is a slur upon the surgeon if a Cæsarean baby should die early through ignorance of this fact and negligence of the benefits of sunlight, for sunlight is the essential factor in the cod-liver oil treatment.

Moreover all babies born of osteomalacic mothers later tend to develop rickets. We have seen a great number of these children with typical rachitic phenomena between the years of 1 and 8. Therefore the parents should be warned of the necessity of proper feeding and

sunlight for their children. There is a deplorable tendency to-day in Bengal to give patent milk preparations to all children whom their mothers cannot nourish. Such feeding is a mistake. Fresh cow's or goat's milk is always procurable, and cod-liver oil can be added in the form of one teaspoonful of the 50 per cent. "Collosool" emulsion of Crookes' twice a day.

Ætiology.

Mellanby, whose work on diet and disease with special reference to teeth, lungs and pre-natal feeding is so well known, postulates that in the prevention of rickets, and we may say also of osteomalacia, three factors are necessary:—

- (a) A sufficient supply of salts and suitable proteins and carbohydrates.
- (b) A sufficiency of the necessary vitamins.
- (c) An activator for calcium metabolism, this factor being bound up with the question of sunlight and movement.

In Calcutta and the plains of India there are periods of the year when vegetables and fresh milk are expensive or unprocurable, and there are localities where the *purdah nashin* restrictions are very rigid.

The Marwari women of Calcutta are peculiarly prone to osteomalacia, and two-thirds of our cases have been seen among this community. The diet of Marwaris consists of wheaten bread, dal, ghee and milk (boiled), cooked vegetables and oil. Their customs do not permit them to touch meat, fish or eggs. They live in tenements or are herded together in large houses in the most crowded parts of the city, and their women rarely go out or have the opportunity of reaching the flat-topped roofs, the result being that although they may arrive from Rajputana strong and healthy, they quickly deteriorate, and owing to the factors A, B, C being defective or diminished, they very readily begin to suffer from one or more of the diverse symptoms of osteomalacia with anæmia.

It may be that the first generation escape, but their children, born and bred in Calcutta, frequently suffer at puberty or after marriage from this disease or rickets. It is no uncommon experience to find female members of long resident Marwari families who have been treated for anæmia with iron and arsenic, for hysteria with bromides and valerian, and for rheumatism with iodides and salicylates, when the whole symptom-complex is merely the result of a food and sunlight deficiency.

Amongst the Mohammedans, owing to their strict *purdah nashin* habits, sunlight and movement deficiencies are perhaps more common factors than food defects alone. Stapleton, writing of the United Provinces, and Vaughan of Kashmir, both emphasise the factors of overcrowding, and the *purdah nashin* as being determining causes of this very frequently seen disease, and are of the opinion that though cod-liver oil is essential, cod-liver oil without

sunlight is of very little use. Our experience amply bears this out.

Cod-liver oil may be separated into saponifiable and unsaponifiable fractions; the anti-rachitic properties are found to be in the unsaponifiable fractions only. This fraction consists principally of cholesterol and phytosterol; if these two substances are irradiated they become anti-rachitic. Rats and dogs fed on irradiated cholesterol develop normally, while those fed with the same substance which has not been exposed to the ultra-violet rays develop rickets.

The skin of animals has much cholesterol, only the brain having more; and since the ultra-violet rays of the sun penetrate only a short distance into the skin, it is to be presumed that these rays activate the cholesterol which exists in the skin, and this is then taken up by the bloodstream and distributed, fresh inactivated cholesterol being brought to the surface in its place. From this it would seem that the skin should perhaps be considered an organ instead of merely a covering.

These biochemical facts are confirmed in the case of rickets and osteomalacia, for the commonest seasons in the tropics to meet with these diseases are the winter months and the rains, when the sun is obscured or people tend to stay indoors in order to keep warm or dry, the consequence being that sufficient cholesterol is not activated by the solar rays, and hence from a vitamine deficiency osteomalacia develops.

Treatment.

The treatment of all disease should primarily be preventive, therefore, seeing that osteomalacia results from dietetic and hygienic errors, there should be no difficulty in eliminating it from the book of India. But it is exceedingly difficult to break through the prejudices of caste and custom. Until sunlight can penetrate verandahs, houses are airy, exercise is possible, and roofs are available for the women folk of all classes of Indian society, and particularly the Marwari community, the disease will not be eradicated. Therefore it should be the aim of City Fathers to see that suitable houses are built, and that the *pardah nashin* inhabitants of a town have the facilities of *pardah nashin* recreation grounds. Where these things are not possible, press, or public health propaganda should clearly demonstrate the folly and danger of lack of sunlight for the women and children of the household, and at the same time adequate provision should be made for an unadulterated milk and food supply.

Improvement Trusts may vastly benefit a town, but in Calcutta dense over-crowding in certain areas must perpetuate the disease, for tens of thousands of women and infant children rarely see the sun except for a brief period at midday when it may shine down into a damp courtyard crowded with cattle and their offal. How often does one not see in narrow alley ways and crowded thoroughfares the sun excluded

by closed shutters, or see dirty sacking over the verandahs to prevent the inhabitants from being observed.

The central well or courtyard system of building may be a cool one, but in crowded cities with fifty to one hundred women and children living in one house, if they cannot all use the roof or freely take exercise thereon, ideal conditions exist for the onset of one of the many symptoms of osteomalacia.

It should be remembered that osteomalacia is not a disease of the very poor who have to earn their living and therefore have few *pardah nashin* restrictions, but is a disease of the middle classes, proud of this custom, who have not the wealth or desire to go out and about and cannot get away to their own country from time to time.

It is difficult to alter the dietetic habits of a thousand years, and we have already remarked on the fact that these people under no circumstance will eat eggs or fish. Moreover they rarely eat any raw vegetables or fruit, the idea of such being unwholesome having quite naturally originated in a country where cholera is endemic.

Everything eaten is boiled may be for an hour or more. Milk is boiled and the vegetable (mustard) oil used in cooking is boiled. In better class families the rice is husked by machinery, and the bran which is thus produced, so rich in phosphates, is given to the cattle. In Calcutta the cows of the wealthier classes are rarely driven out to graze, but are dry fed in dark stables under the living rooms, the result being that the milk supply is vitamine-deficient and the quality of the ghee, a household necessity, extremely poor.

For those who are unable to keep their own cattle it is a matter of vital importance that the ghee supply to a city should be pure and unadulterated.

To the writer it has seemed as if many of the bowel, blood and bone diseases of the women in Bengal can be attributed to an impure ghee supply, or to ghee prepared from the milk of stall and dry fed cattle, for during the hot months cattle which graze on parched *maidans* or stubble grass give milk which is 50 per cent. short of vitamins A and D. Such milk is conducive to rickets in the child or osteomalacia in the mothers who live in the over-crowded parts of a city.

It may be that education, propaganda and time will alter affairs, but these are matters which vitally concern ward councillors and municipalities to-day.

Drugs.

In 1925 and 1926 we began giving calcium in lactate or phosphate form by the mouth, but during the last two years, having got very little result from these, we have substituted injections on alternate days of 2 c.c. of "Collosol" calcium (Crookes). In this form the calcium apparently is taken up by the blood, for

our experience is in agreement with Professor Dixon's that calcium is inert and not absorbed when given by the mouth. At one time we gave parathyroid gland in one-twelfth of a grain dose twice a day, but results were negative.

Cod-liver oil combined with sun baths on the roof or verandah, or in the open field is the essential drug treatment. We order one ounce twice a day, taken alone or in milk. From caste or taste prejudices, at times it is refused, but when once its beneficial results can be demonstrated by the example of another patient of the same community, it will usually be taken. It is the fishy smell and taste which prejudice Marwaris against it.

Ostelin and "Collosol" cod-liver oil have not been nearly so successful as the raw drug.

During the last year if prejudice to cod-liver oil has been very great, or we have thought, despite statements to the contrary, that the drug had not been taken because the symptoms were not alleviated, we have been obtaining astoundingly good results with intravenous injections of sodium morrhuate made up in ampoule form by Smith Stanistreet and Co. We give two injections a week, beginning at 1 c.c. and gradually working up to 6 c.c. These injections are painless and symptomless, they do not offend caste prejudices, and are remarkable in the way they cause subsidence of the muscular and bony pains of the disease. The general health rapidly improves and we have seen patients huddled, crippled and groaning in the corner of a room, or even paralysed, walking about cheerfully within a month.

Intravenous sodium morrhuate is most particularly useful in pregnant patients with acute symptoms of osteomalacia. We have used it in a great number of cases with signal success.

Early in 1926 in addition to the above measures we began giving irradiated cholesterol, prepared according to the technique of Parsons by submitting pure B. D. H. cholesterol in thin layers on a Petri dish to the rays of a quartz mercury vapour lamp for one hour at a foot distance. Two drachms of the irradiated drug are then dissolved in four ounces of liquid paraffin and a dosage of 2 drachms of the liquid is ordered twice a day in addition to the cod-liver oil. We found it was not wise to irradiate more than one week's supply at a time because the drug quickly deteriorates or loses its potency in the tropics.

The effect of irradiated cholesterol is most marked upon the bony symptoms. We have had cases that were refractory or slow in responding to cod-liver oil, in whom improvement has been immediate when this preparation has been given. It is worthy of record that uneducated patients themselves have told us that the white medicine (paraffin) gave them great relief, and the records of 37 patients to whom it was given bear this out.

It should be stated that whether irradiated cholesterol synthesises the anti-rachitic factor

vitamine D, or mobilises the reserves of vitamine A has not yet been determined.

This year in an endeavour to diminish the cost of the above treatment, we have tried Radiostol, but patients have not benefited; presumably the quality of this preparation changes during transit from Europe.

In the tropics with its abundant sunlight, it is rarely necessary to have recourse to ultra-violet radiation by carbon arc lamps, but in a few cases where the pains or the bony lesions have been very marked, we have submitted patients to direct ultra-violet ray treatment with benefit. Babies born of osteomalacic mothers, either naturally or after Cæsarean section, have done very well under ultra-violet rays in the hands of an expert in a few difficult cases.

The essential medical treatment therefore of osteomalacia may be summed up as an improved diet, fresh air, sunlight, cod-liver oil or intravenous sodium morrhuate, and irradiated cholesterol, with or without injections of collosol calcium.

Sometimes it is a good plan to give for a few days santonin or carbon tetrachloride (tetraform) with the object of eliminating possible intestinal parasites before commencing the essential treatment.

We have no intention of discussing the operative measures for osteomalacia, for when once its early diagnosis, prevention and treatment are generally recognised, the necessity for craniotomy or Cæsarean section will become exceptional, for the disease in its early stages can be aborted and cured. Moreover, then we shall rarely see those un-get-at-able and inoperable cases of vesico-vaginal fistulæ which at present in rural India are one of the most terrible sequelæ of this disease.

To give an idea of how common osteomalacia is in Bengal, it may be of interest to state that during the last 30 months out of 2,870 maternity cases which have passed through the labour room of the Eden Hospital, it has been necessary to perform 26 craniotomies and 15 Cæsarean sections for osteomalacic conditions *alone*.

Of the Cæsarean sections 8 were Hindus, 1 was a Mahommedan, 2 were Anglo-Indians, 3 were Marwaris and 1 was a European. Of the craniotomies 18 were Hindus, 5 were Marwaris, 2 were Mohammedans and 1 was an Anglo-Indian. Alas! all these craniotomies could have been obviated were the benefits of ante-natal care and supervision generally understood and practised.

I have to express a great debt of gratitude to Drs. N. L. Barman, G. N. Roy, S. N. Das and Dhaur for the pains they have taken to follow up and so energetically treat and cure so many of these patients, seen in consultation with them.

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A NEW ORGANIC AROMATIC COMPOUND OF BISMUTH SUITABLE FOR INTRAVENOUS INJECTION IN THE TREATMENT OF FRAMBÆSIA.

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BISMUTH compounds were used as cicatricising agents in cutaneous lesions as far back as the 17th century, and in 1780 they were used internally for the treatment of gastro-intestinal affections. Balzer (1889) carried out a series of experiments on dogs to test the toxicity of bismuth compounds with a view to their employment against syphilis, but he found them so toxic that he had to abandon their use. Robert and Sauton (1916) tried bismuth preparations in the treatment of spirochaetosis of fowls and found them to be very efficacious. The experiments conducted by these investigators were confirmed by Szarec and Levaditi (1921) who showed that in experimental syphilis of rabbits bismuth compounds had a well marked curative action. They also tried compounds of bismuth against syphilis in man and found that they produced rapid cicatricisation of the lesions of this disease. Since these facts have come to light a number of compounds of bismuth have been put on the market because the cost of treatment with bismuth preparations is much cheaper than with the organic arsenicals. The older preparations of bismuth recognised by the *British Pharmacopœia* such as bismuth subnitrate, bismuth carbonate and subcarbonate, etc., were not suitable for injection and could only be given by the mouth. As only very minute quantities of bismuth are absorbed from the alimentary canal their action was chiefly local on the mucous membrane. During the last decade efforts have been made to prepare a number of new compounds which could be given by the intramuscular or by the intravenous route. Of these tartro-bismuthate of sodium and potassium known by the trade name of "Trepol" was one of the very early preparations which

was put on the market; it is sold in the form of an emulsion in oil and in solution in water. Colloidal suspension of bismuth hydroxide, bismuth oxychloride in suspension in camphor water (bischloral), basic salicylate of bismuth which is soluble in water and is recommended for intravenous use, sodium trioxo-bismuthate which is an aromatic compound containing 50 per cent. of bismuth, and colloidal metallic bismuth are some of the other preparations which are in use. The disadvantage of most of these preparations is that they are not satisfactory for intravenous administration, and even for intramuscular injections most of the compounds that we have tried produced much pain and discomfort to the patient. The insoluble compounds, though not so painful as the soluble ones, are not absorbed quickly and regularly, so there is danger of cumulative poisoning from their use. When given intravenously the bismuth compounds produce agglutination and hæmolysis of the red blood corpuscles and may give rise to emboli and severe reactions. Even such compounds as soluble tartro-bismuthate or colloidal preparations which do not produce hæmolysis and agglutination, produce severe reactions following intravenous injections. Magnus (1924) reported cases of sudden death after intravenous injections of bismuth compounds with symptoms of colloidal shock.

It was for these reasons that we endeavoured to get a compound which could be given intravenously with safety. This was attained through the efforts of Dr. B. C. Ghose, D.Sc., in-charge of the Chemical Department of the Union Drug Company of Calcutta to whom the entire credit of preparation of this compound is due. He succeeded in preparing a soluble organic compound of bismuth which is freely soluble in water and which can be given intravenously without producing any untoward effects. This compound is an organic aromatic compound of bismuth and is practically the bismuth analogue of urea-stibamine. Chemically it may be described as a sodium salt of para-amino-phenyl-bismic acid in combination with urea, and has been given the trade name of "Bisnene." This compound has been given the following formula by its author: $\text{NH}_2\text{—CO—NH—C}_6\text{H}_4\text{BiO—(OH)ONO}$. Analysis shows that it contains 50.1 per cent. of bismuth and this is an important fact, as the curative properties of these compounds are proportional to their bismuth content.

Preparation of "Bisnene" and its Toxicity.

The first stage in the preparation of the compounds is the acetyl para-amino-phenyl-bismic acid, obtained by a modification of the well-known Bart's reaction for the preparation of the corresponding antimony compound. The acetyl compound is hydrolysed with caustic soda solution and the para-amino-phenyl-bismic acid condensed with urea. The salt thus obtained is dissolved in water, and made alkaline with

caustic soda solution. The solution is neutralised with dilute acetic acid, saturated with carbon dioxide, filtered, and precipitated with sodium chloride. The sodium salt thus obtained is washed with salt solution and dried in vacuum on a porous plate. The compound thus formed is freely soluble in water (15 per cent. at 33°C.) giving a brown coloured clear solution which has a slightly acid reaction ($\text{Ph} = 5.9$). It is not decomposed by boiling.

Intravenous injections of this compound in experimental animals produce no marked fall of blood pressure and no effect on the respiration. No other untoward effects such as inflammation of the kidneys and the liver, which are usually met with after intravenous injections of bismuth compounds, could be detected in animals even after large doses of this compound. Its minimum lethal dose for white mice is 500 mgm. per kilo body-weight.

"Bisnene" in the Treatment of *Framboesia*.

During the course of his investigations on the prevalence of leprosy in Bihar and Orissa, Dr. Muir came across a number of cases which were presented to him as suffering from leprosy, but which on closer examination were found not to have leprotic lesions. Further examination showed that these patients were suffering from *framboesia* and that this disease was not uncommon among the inhabitants of Singbhum district. Four of these cases were sent to the Carmichael Hospital for Tropical Diseases for further investigation and Lieutenant-Colonel R. Knowles, I.M.S., Professor of Protozoology, handed them to me for treatment after he had confirmed the diagnosis by finding *Treponema pertenue*. Two classes of compounds have been successfully used in the treatment of *framboesia*. It is well known that 2 or 3 injections of organic arsenicals produce most wonderful effects in this disease and lesions which have lasted for fifteen or twenty years disappear rapidly in a short time. In 1923 the senior author in collaboration with Colonel Knowles successfully treated 12 cases of *framboesia* sent from Assam with organic arsenicals, including silver-salvarsan and sulfarsenol.

In this series of cases we tried the effect of the new compound "Bisnene." We gave very small doses to start with, but since no untoward effects were produced the dosage was rapidly increased. We are also trying this compound in the treatment of syphilis and filariasis, and in some cases we have given as much as 3.0 gm. in all without producing any toxic effects. These results will be published in a separate paper. A perusal of the description of these cases given below shows how the lesions rapidly healed under the treatment with this compound:—

Case No. 1.—Doboo Gom, Hindu male, aged 18 years, inhabitant of Gitikendu in Singbhum district. First lesion appeared on the nose two years ago.

Condition on admission:—There is a cauliflower-like growth on the nose extending along the border of the nostrils up to the margin of the upper lip. There is

also an oval growth $2'' \times 1''$ on the chin. Smears from the lesion show *T. pertenue* in small numbers. Wassermann reaction slightly positive.

Treatment:—0.05 gm. of "Bisnene" was given intravenously dissolved in distilled water on 15th November, 1927. A very small dose was purposely given as this was the first dose of this compound given to a human subject. The injection was well borne and no untoward symptoms were produced. On 23rd November, 1927, a second injection of 0.1 gm. was given with the same result; a few days after this the cauliflower-like growth began to shrivel. A third injection of 0.15 gm. of "Bisnene" was given on 29th November, 1927; this was followed by rapid improvement, the ulcer showing signs of healing. A fourth injection of 0.175 gm. was given on 15th December, 1927, and very soon after the ulcers completely healed. The patient was discharged from the hospital considerably improved in general health. Weight on admission 80½ lb.; weight on discharge 93½ lb.

Case No. 2.—Ann Ho, Hindu male, aged 45, inhabitant of Gitikendu, in Singbhum district. Admitted to the hospital on 29th October, 1927. First lesion appeared 5 months ago on the penis. Other members of his family have suffered from a similar condition.

Condition on admission:—Small ulcers 4 in number over the anterior abdominal wall, size varying from 2" to 1" in diameter, oval in shape, covered by dark-coloured hard crusts; there are also three similar ulcers on the right side of the chest and two very small ones about the size of a pea on the left side of the chest. Smears from these lesions showed *T. pertenue* in fair number.

Wassermann reaction moderately positive.

Treatment:—A first injection of 0.1 gm. of "Bisnene" was given on 19th November, 1927, in 4 c.c. of distilled water; no reaction or untoward symptoms were produced. A second injection of 0.125 gm. was given on 26th November, 1927, after which one of the ulcers on the right side of the abdomen began to look cleaner; no marked change in the others. A third injection was given on 5th December, 1927, after which all the lesions showed signs of healing. A fourth injection of 0.175 gm. was given on 15th December, 1927. No reaction was produced and after a few days all the lesions were healed. Weight of the patient at the time of admission was 90½ lb.; at the time of discharge from the hospital was 104 lb. The patient looked much improved in general health.

Case No. 3.—Royu, Hindu male, aged 35, inhabitant of Gitikendu in Singbhum district. First lesion appeared on the right hand nearly four years ago.

Condition on admission:—The fingers of the right hand are thickened, deformed and flexed on the hand; joints fixed; the palm is contracted. Extensive scar present involving the upper part of the right forearm and nearly the whole of the upper arm; the elbow is fixed at right angles by the scar tissue; thickened dry scaly ulcer near the axilla. Left side of the upper portion of chest and neck show marked thickening and has a dry scaly ulcer. Bridge of the nose is flattened; there is a hard nodule on the left side of the bridge of the nose. A few small ulcers can be seen on the lower extremity and other parts of the body. Wassermann reaction strongly positive. No *T. pertenue* could be detected in the ulcers. Patient complains of much pain over the affected area.

Treatment:—First injection of 0.05 gm. of "Bisnene" was given on 18th November, 1927, followed by a second injection of 0.1 gm. on 25th November, 1927. No reaction was produced after the injections but no improvement in the lesions. A third injection of 0.15 gm. was given on 2nd December, 1927. The pains in the elbow and shoulder joints disappeared and the ulcers began to show signs of healing. A fourth injection of 0.175 gm. was given on 15th December, 1927. All the ulcers healed up after this injection and the pains over the joints entirely disappeared. General condition of the patient is much improved. Weight on admission 92½ lb.; weight on discharge 103½ lb.

Case No. 4.—Murm Ho, Hindu male, aged 30 years, inhabitant of Gitikendu in Singbhum district. First lesion appeared on the head three years ago.

Condition on admission:—Irregular depigmented areas of various sizes are present on both the extremities and on the ears; the skin around these white areas is thickened and scaly. In places there is increased pigmentation. Some of the lesions consist of thickened and fissured skin, hard to the touch. Wassermann reaction negative. No *T. pertenue* detected in the lesions.

Treatment:—0.05 gm. of "Bisnene" was given intravenously on 16th November, 1927, followed by a second dose of 0.1 gm. on 24th November, 1927. After this injection the patient began to improve. On 1st December, 1927, another dose of 0.15 gm. was given, and a few days after the surface of the lesions began to clear up. On 15th December, 1927, 0.175 gm. was given. This produced a rapid healing of the lesions but the leucodermic patches remained unaltered. The patient was discharged from the hospital considerably improved in health. Weight on admission 103½ lb.; weight on discharge 112 lb.

Summary and Conclusions.

(1) An organic aromatic compound of bismuth, the sodium salt of para-amino-phenyl-bismuth acid in combination with urea, has been prepared which is suitable for intravenous injections. It has been given the trade name of "Bisnene" by the makers.

(2) This compound has a low toxicity, its minimum lethal dose being 500 mgm. per kilo to white mice. It produces no untoward effects after intravenous injection in animals or human subjects. We tried "Bisnene" in four cases of frambœsia and after four injections the lesions rapidly cleared. In this respect the compound acted as promptly as the organic arsenicals.

We are very grateful to Lieutenant-Colonel R. Knowles for kindly allowing us to try this compound on these cases.

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A SIMPLE APPARATUS FOR FACILITATING RADIOGRAPHY OF THE LIMBS.*

By J. H. BARRETT,
CAPTAIN, I.M.S.;
Quetta.

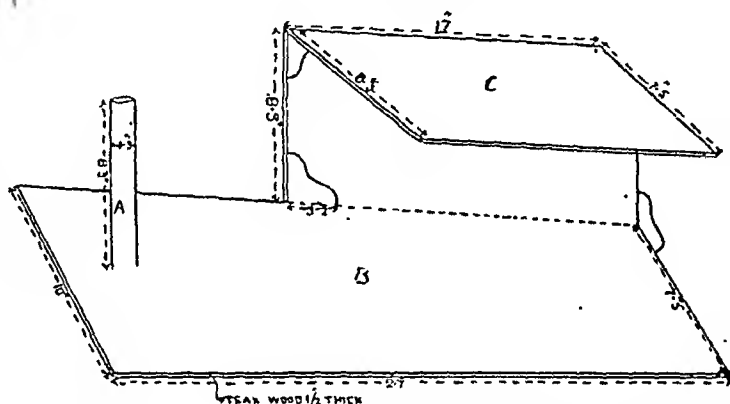
As the limbs are X-rayed far more frequently than the rest of the body, it may be of interest to describe briefly a simple piece of apparatus which I find extremely useful as an aid to getting the affected limb in a satisfactory position during the examination.

Briefly it consists of a piece of wood (B) with a short round upright (A) at one end and a shelf (C) along one side. An inspection of the diagram will show what the apparatus looks like, and from the measurements given it can be constructed by any *mistri* of average intelligence.

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The method of using the apparatus is shown below:—

Part under examination.		Method.
Fingers	.. P.A.	Patient rests hand on the shelf.
		Oblique. Patient rests hand against the upright.
Carpus	.. P.A.	Patient rests hand on the shelf.
		Lateral. Patient grips the round upright.
Wrist	.. P.A.	Patient rests hand on the shelf.
		Lateral. Patient grips the round upright.
		Stereo. As for P.A.
Forearm	.. A.P.	Patient rests arm on the main board.
		Lateral. Patient grips the round upright.
Elbow	.. A.P.	As for forearm.
		Lateral. Patient rests elbow on the shelf.
Toes	.. P.A.	Patient rests foot on the main board.



Tarsus	.. Oblique.	Patient rests the plantar aspect of the foot against round upright and the inner aspect of leg against the shelf.
Ankle joint and lower third of leg.	A.P.	Patient presses the plantar aspect along the round upright with his leg resting on the main board.
Ankle joint and lower third of leg.	Lateral.	Turn the apparatus so that the back wall of the shelf support is uppermost and put the inner aspect of the patient's ankle on this, or simply place the ankle on the main board.
Knee joint	.. A.P.	Turn the apparatus upside down and place the limb on it.
	Lateral.	With the apparatus still inverted and with the sound limb in the groove between the shelf and the main board lateral views are quickly and easily obtained.

Remarks.

- (1) The apparatus facilitates the production of standard skiagrams of the limbs.
- (2) It saves time.
- (3) With intelligent patients there is no need to fix the limbs with bands or sandbags.
- (4) It is simple, cheap, and easily constructed.

A SPECIAL X-RAY TECHNIQUE FOR THE EXAMINATION OF THE BODY OF THE MANDIBLE.*

By J. H. BARRETT,

CAPTAIN, I.M.S.,

Quetta.

It sometimes happens in the radiography of bones that where, clinically, periostitis and even superficial bone necrosis seem to be present, one is not always able to demonstrate the lesion on the X-ray film. So that where the clinical signs are marked it is well to X-ray the bone at different angles, so as to get the lesion (where it involves only part of the circumference of the bone) in silhouette, so to speak. I find this method particularly useful in the mandible, ribs and the skull. Suppose for instance there is a superficial necrosis of the external surface of the mandible over an area extending from the angle of the jaw as far forward as the canine tooth. Supposing it happens to be the right side of the lower jaw. By routine methods excellent skiagrams may be obtained of that particular side where the bone may be shown almost from the symphysis to the temporo-maxillary joint. Such skiagrams show the bone with its external surface nearest to the film, and for that reason one would expect a bone lesion to be shown in every case. The contrary, however, is my experience. The explanation appears to be as follows:—In the case of a rather flat type of bone, when the lesion is local and does not extend to the margins of the bone, and when it is X-rayed with the lesion surface nearest the film, then the normal trabeculae of the bone are superimposed on and obscure the abnormal, or when the trabeculae of the lesion are missing (as in bone destruction) the normal trabeculae fill in the space and so the bone looks normal.

Stereo-photographs are sometimes helpful, but stereo-photographs like all X-ray photographs are composite shadows and moreover are not applicable to all cases. So that it seems better to photograph the lesion in silhouette where this is practicable. I have devised a special technique for lesions involving the portion of the lower jaw between its angle and the canine tooth. Its main object is (a) to demonstrate local periostitis or necrosis of the external surface of the mandible, (b) to show the position of fractures in that portion of the bone, and (c) to demonstrate the extent of tumours arising from the bone.

THE METHOD.

Posture.—The patient lies recumbent on the X-ray couch. The back of the head rests on an inclined plane, which has an angle of 22 degrees. The plane is of wood, covered by a soft towel. Suppose the right side of the lower jaw is to be examined. Place a cork (previously steamed and attached to a string) between the left molars, so

as to open the mouth to the maximum consistent with comfort.

Tube Position.—The X-ray tube, with a six inch cylindrical diaphragm, is now centred so that the central bundle of rays will pass through a line drawn through the crown of the left upper canine tooth, and half an inch anterior to the angle of the mandible (right side). To do this the patient's head will be inclined to his right side. The tube should be perfectly horizontal, with anode-kathode line parallel with the couch. The centering will be greatly facilitated by the use of a centering rod or other centering device.

Film Position.—An assistant now takes a film ($6\frac{1}{2} \times 8\frac{1}{2}$), and shakes it in an envelope so that the film touches the long edge of the envelope all the way. The envelope with its contained film is now pressed against the right side of the portion of the jaw under examination, i.e., right side. To ensure rigidity a piece of oblong wooden board ($6\frac{1}{2} \times 8\frac{1}{2}$), covered with lead sheeting, is used under the film. The distance from the kathode to the film should be 18 to 20 inches. The assistant should wear lead-lined gloves. The immobilization of the patient's head is assisted by the use of a sandbag or a weighted band.

GENERAL REMARKS ON THE METHOD.

A high tension transformer or a coil may be used. The latter with a gas tube seem to give the richest skiagrams. The tube it will be seen is used fairly close to the film, as in that way the upper jaw as well as the symphysis of the lower jaw are projected well out of the way. The tube should be working at an alternative spark gap of 5 to 6 inches. Absolute immobility of the part is essential and the patient should hold his breath during the exposure. Short exposures should be used, as there is then less likelihood that movement will occur.

THE METHOD WHEN TWO PHOTOGRAPHS ON ONE FILM ARE REQUIRED.

A thin sheet of lead is required to cover the unexposed portion of the film. The second exposure is made with the X-ray tube at a slightly different angle. Thus the tube should be placed so that the central bundle of rays shall pass (in the case of the right side of the jaw) through the line first right incisor tooth, one inch anterior to the angle of the mandible. In this way a second useful projection of the area may be obtained. Similarly the other side of the jaw may be X-rayed for comparison.

THE METHOD WHEN STEREO-RADIOGRAPHY IS EMPLOYED.

The positions of the patient, the film, and the centering of the tube, are those which I have already described. For the first exposure however the X-ray tube is moved 3 cm. to one side in a direction perpendicular to the line of the body of the mandible. One-half of the film is protected with a lead sheet, and the photograph taken. The film is now "somersaulted" so that

* Published by kind permission of the Director of Medical Services, India.

the reverse (unexposed) portion is pressed under the jaw—as for the first photograph. The X-ray tube is now moved 6 cm. in a direc-

(d) Wisdom teeth
(e) Dental caries, dental cysts or dental abscesses.

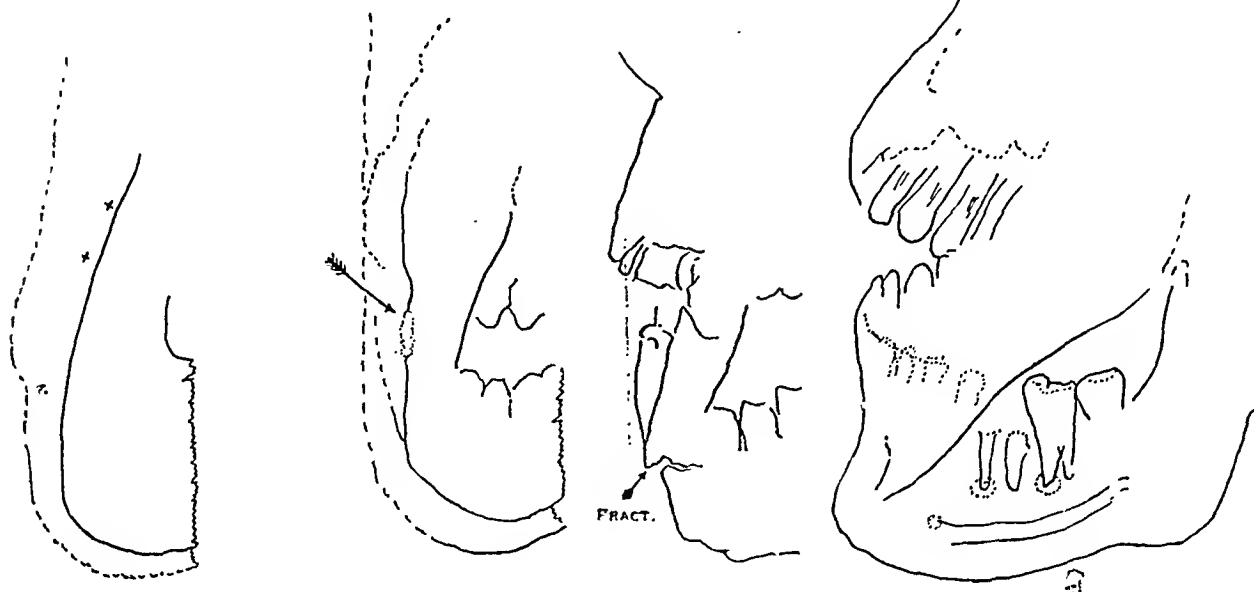


FIG. 1.

FIG. 2.

FIG. 2a.

FIG. 3.

tion opposite to that which was used for the first photograph. The exposed half of the film is covered with lead sheeting and the second photograph taken.

To examine the stereo-radiograph a small oblong or square mirror and viewing lantern are required. By holding the mirror in position between the two images on the single film, very little effort is required to superimpose one image on the other, and thus obtain the stereoscopic effect.

A glance at the figures marked Fig. 1, Fig. 2, and Fig. 2a will show what a skiagram of the lower jaw looks like, when taken in the manner just described.

Fig. 1 is a tracing of a skiagram of the normal jaw.

Fig. 2 is from a case of superficial necrosis of the jaw.

Fig. 2a is a tracing from a skiagram of a case of partial fracture of the lower jaw.

Fig. 3 is a tracing from a skiagram of a normal jaw (Lateral view).

CONCLUSIONS.

1. The method is of value, and without using it (at any rate in certain cases) the radiographic examination of the mandible cannot be considered complete.

2. It may show lesions missed by the usual method of taking only a lateral view of the jaw.

3. It helps to elucidate lesions involving the internal and external surfaces of the mandible.

4. It is valuable in the investigation of—

- (a) Fractures
- (b) Osteomyelitis
- (c) Tumours

5. By combining the method with stereo-radiography, a more exact conception of the various structures may be obtained.

INFESTATION OF THE HUMAN INTES TINE BY COPRID BEETLES IN BENGAL.

By M. O. T. IYENGAR,

Entomologist, Bengal Public Health Department, Calcutta.

THE passing of certain live beetles, usually of a small size, by children in some parts of Bengal is a matter of frequent occurrence, especially during the early part of the rainy season. It has been observed by various people from time to time, chiefly by the lay public. Medical men have also noted such occurrences off and on, but there have hitherto been only a few records of such infestations, considering the wideness of the prevalence. Perhaps the first persons to call attention to this subject were Drs. A. C. Dey (1919), S. C. Sen (1919), T. N. Chakravarty (1919), A. C. Dey (1920), and S. C. Sen (1924). The beetles concerned in this infestation are small beetles of the family *Scarabæidæ*, sub-family *Coprinaæ*.

The habits of the beetles concerned in this infestation of children's intestines are such that they are not easily observed. Firstly, they are small; secondly, they mostly infest children who do not understand that there is anything wrong when these beetles come out of the stool they have passed; and lastly, the beetles take to their wings immediately they are liberated. It would be difficult to catch them after they have taken to their wings, and before they commence to

fly they are unrecognisable. These facts explain the fewness of observations on these interesting beetles. There appears to have been some doubt as to the authenticity of these observations, but it may be enough to mention that besides being well-known to the lay public in some districts of Eastern Bengal, there have been several first-hand observations made by medical men. There have also been a few instances in which the beetles were voided after the administration of an enema (Chakravarti, 1919); in one instance (Senior-White, 1920), beetles were found within the intestines in a case at autopsy.

But the identity of these beetles has not been properly understood and medical men as well as the lay public mistook these beetles for the mango beetles of the genus *Cryptorhynchus*. As the infestation by these coprid beetles coincides with the time when the mango is in fruit, these beetles are taken to be those which infest the mango fruit. It was Senior-White (1920) who, for the first time in India, identified specimens of beetles which were voided by children in Ceylon and he identified them as *Onthophagus bifasciatus*. The first of these beetles to be identified from Bengal was by Senior-White and Sen (1921), who also identified them as *O. bifasciatus*. In 1923, the present writer pointed out that besides *Onthophagus*, another genus, *Caccobius*, allied to *Onthophagus*, infested the intestines of children in Bengal. The species concerned in this case was *Caccobius mutans*, Sharp (Iyengar, 1923).

Since 1923, several instances of beetle infestation of the intestines of children have come to the writer's notice and the specimens collected from authenticated cases have been identified. To Mr. G. J. Arrow who rendered considerable help in this direction the writer is much indebted. The specimens from Bengal have been identified as *Onthophagus bifasciatus*, F. After an examination of the series of specimens of this group sent to Mr. Arrow, he has come to the conclusion that *O. birmanicus*, Harr., which was separated from *O. bifasciatus* on account of the long cephalic horn of the male, is really synonymous with the latter, as gradations from the long horned *birmanicus* form to the short horned *bifasciatus* form were to be seen in that series. In view of the identity of *O. bifasciatus* with *O. birmanicus*, Harr., the range of distribution of the species covers the whole of Northern India and Burma.

The following are fresh records of intestinal infestations by *O. bifasciatus*, Schall. (*O. birmanicus*, Harr.).

1. Damodya, Faridpur District, Bengal, Dr. S. K. Sil.
2. Berhamganj, Faridpur District, Bengal, Dr. A. C. Dey.
3. Faridpur, Dr. A. K. Sarkar.
4. Akyab, Burma, Dr. S. C. Sen.

Onthophagus unifasciatus is another species closely allied to *O. bifasciatus*, and this species has also been found to have similar habits of infesting the intestines of children. The following is a fresh record of such infestation:—

Himoo, Ranchi, Bihar, Dr. H. Prajapati.

(I am indebted to Lieut.-Col. J. G. P. Murray, I.M.S., and Lieut.-Col. R. Knowles, I.M.S., for the specimens and case-history of the patient.)

This is possibly not the only record of *Onthophagus unifasciatus*. The first record of such a habit of this species is possibly from Matale, Ceylon, by Senior-White (1920) who figured the specimen and determined it as *O. bifasciatus*.*

The definite records hitherto of properly determined beetles from authenticated cases of infestation of human intestines by coprid beetles, may be summarised as follows:—

1. *Onthophagus unifasciatus*, F., recorded by Senior-White (1920) as infesting the intestines of children in Ceylon; recorded from children in Ranchi, Bihar, in the present paper.

2. *Onthophagus bifasciatus*, Schall. (*O. birmanicus*, Harr.), recorded by Senior-White and Sen (1921) from Bengal; now recorded in the present paper from Bengal and Burma.

3. *Caccobius mutans*, Sharp, recorded by Iyengar (1923) as infesting the intestines of children in Bengal.

Caccobius mutans is a very tiny black glistening beetle measuring 2.6 mm. by 1.8 mm. and has a smooth body. *Onthophagus bifasciatus* and *unifasciatus* are larger beetles and their outer wings are marked with a broad black band over a brown background. They measure from 2.9 mm. to 4 mm., by 4 mm. to 5.8 mm., but they generally measure about 4.0 mm. by 5.6 mm. The following gives the points of difference between these two species of *Onthophagus*:—

Onthophagus unifasciatus, F. Sexes alike, no cephalic horn, but three elevations on thorax.

Onthophagus bifasciatus, Schall. Sexes unlike, a head horn and three thoracic lobes in the male, and a head carina and three thoracic tubercles in the female.

Onthophagus unifasciatus and *Caccobius mutans* are rare species in Northern India. *Onthophagus bifasciatus* is more common and has been collected by the writer from various parts of Bengal, including the districts of Jaipauri, Faridpur, Dacca, Howrah, Calcutta and 24-Perganas. It is likely that this species is prevalent in most of the districts of Bengal. This insect is found in or near human excrement, either within the hard stools or in the mud just under it. But even here its numbers are few compared to the number of other coprid beetles found in such situations. This insect

* Mr. Arrow in a communication to me says, "The species figured in the paper by Mr. Senior-White is *O. unifasciatus*, which is a common species in Ceylon. It is doubtful if *O. bifasciatus* occurs there."

PLATE I.



FIG. 1.



FIG. 2.

Fig. 1.—*Onthophagus bifasciatus*, male, with a short cephalic horn, (magnified 8 diam.)
 Fig. 2.—*Onthophagus bifasciatus*, female (magnified 8 diam.)

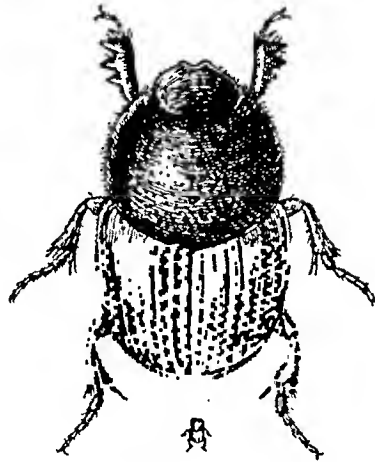
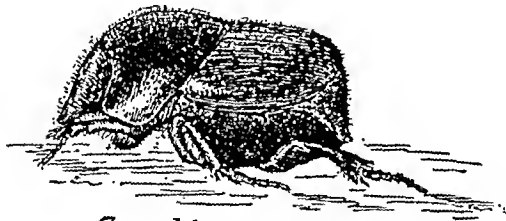


FIG. 3.



Caccobius mutans, Sharp.

FIG. 4.

Fig. 3.—*Caccobius mutans*, dorsal view (magnified 14 diam.)
 Fig. 4.—*Caccobius mutans*, lateral view (magnified 14 diam.)
 The small figure at the centre shows the natural size.

is fond of darkness, and when exposed to daylight it feels uneasy and quickly flies away. It is often attracted to light at night and specimens have often been collected inside houses near a light at night. This species is usually nocturnal in its habits and specimens may be seen flying into privies during the evenings, and flying away from them at daybreak.

In the province of Bengal, infestation of the intestines of children by these beetles appears to be fairly common, especially in the eastern wet districts. It would be of interest to obtain the notes of medical men who had under their charge cases of intestinal infestation by these coprid beetles. I am indebted to these medical officers for the notes they have sent me.

Dr. B. K. Ray, District Health Officer, Dacca, writes "I have personally observed some of these beetles being passed alive by children, not necessarily suffering from diarrhoea. They resemble the mango beetles and fly away immediately after they are passed in stools."

Dr. A. C. Dey (Faridpur District) writes "I have seen only children below ten years of age affected by these insects, but no adults. The main symptoms of this affection in the children are diarrhoea, flatulence, anorexia and anaemia combined with the passing of these beetles with stools. The insects come out with the stool and staying in it for a minute or two, begin to move and fly away." Of another case in his charge Dr. A. C. Dey says "My patient is a boy of one year, his main diet mother's milk, cow's milk and barley water. Formerly he used to pass eight to ten live beetles per day. The number of beetles passed are fewer now." These beetles have been identified as *Onthophagus bifasciatus*.

Dr. S. C. Sen had under his observation at Akyab, Burma, a case of a similar infestation by *Onthophagus*. The following notes of the case may be of interest. "Padan, a male child aged 4, contracted the disease in the month of July 1923, in the village of Chakdaha, Lomsingh, Faridpur District, Bengal. There he was treated for diarrhoea by many physicians for more than four months but to no effect. He was brought here for a change and placed under my treatment. He was pale and very emaciated. His bowels were very loose, six to seven stools per day; the motions were muddy and of a very offensive smell, and accompanied always with a quantity of thin mucus. He had a voracious appetite and thirst. The stools were examined for hookworm and amœbæ but none were found. The beetles were passed especially when the stools were very loose, sometimes six or seven beetles at a time. The patient had slight œdema of the legs and the face was puffy. There was no rise of temperature. The beetles were seen to fly within a couple of minutes of their expulsion." The specimens collected from this patient have been identified as *Onthophagus*

Dr. S. C. Sen had another case in his charge of which he writes as follows:—"My second case, a boy of two years, contracted the disease in Akyab. He was a frequent visitor to the house of the former child (Padan). He got diarrhoea and started passing stools."

Dr. Prajapati of Ranchi, Bihar, had several cases of this kind under his observation and he sent in the specimens of beetles actually collected by him from one of the cases, and these have been identified as *O. unifasciatus*. The patient was a two year old daughter of a Bengalee clerk residing in Hinoo (a place close to Ranchi). "These beetles" he says, "were produced before me, saying that the patient has been passing these beetles for the past six months, and that the elder sister, aged five years now, used to pass this kind of insect at the age of about two years. At the present time, the elder child is free from the affection." About the beetles themselves, he says, "these beetles were picked out by the father of the child from the body of the hard stools passed. It has also been stated that generally these beetles, after the passage of the stools, make their way out of the stool and fly away." As regards the condition of the patient, he says that "she was anæmic and emaciated but had a voracious appetite." It appears that this affection is frequent at Ranchi. Dr. Prajapati says, "Two more Bengalee clerks report to me that their children too pass these insects off and on. They live in Doranda (near Ranchi)."

Dr. A. K. Sarkar, District Health Officer of Faridpur, writes to say that this disease is very common in the district of Faridpur, and he sent me two specimens of *Onthophagus bifasciatus* which were collected by him from a child.

The manner in which these beetles gain entrance into human intestines is still unknown. At the most only vague guesses have been made as to the probable modes of entry. Two methods readily suggested themselves as to the manner of invasion; either that the beetles enter by mouth or that they do so *per rectum*. As regards entry by the mouth, it is possible that live beetles are accidentally swallowed along with mud or dirt by children, and should such a thing happen, the beetles might be passed out alive with the stools if they are capable of withstanding the conditions within the stomach of the child for the period of their captivity. But a chance entry like this is not likely to cause such definite symptoms as have been found in the case of children that are subject to this trouble. Further, it has been found that the same child passes these beetles off and on, as many as six or seven beetles being expelled with stools in one day. As all these beetles belong to the same species, the view that the infestation is due to accidental swallowing of live beetles along with dirt or mud by children does not hold good. If such accidental swallowing was the cause, we ought to encounter different kinds of insects and it is extremely unlikely that

as many as six or seven of these rather rare species should be swallowed by the child every day.

All these considerations point to some more definite method of entry, either of the adult beetle or of its immature stages. The other possible method of entry of the beetles by the mouth is by means of eggs laid in the food. This view was advanced by Senior-White (1920) with regard to the species infesting children in Ceylon. He suggested that in Ceylon the infection might occur through eggs being deposited on partially decomposed fish, an important article of diet among the Ceylonese. But against this view is the fact that children just about a year old, whose diet consisted solely of milk and barley water, were affected by these beetles, and in such cases the swallowing of eggs with the food is out of the question. In addition to this, we should consider whether it would ever be possible for the larval and pupal stages of these beetles to withstand the wet and anaerobic conditions prevailing within the human alimentary canal until such time as they can emerge out as adults. Adult scarabeid beetles are sometimes capable of withstanding the most trying conditions, but it is doubtful if the larvæ and pupæ are adapted for development under such unusual conditions. Moreover, in none of the cases of beetle infestations have any grubs or pupæ been recovered from the stools even after the administration of purgatives.

The more likely method of invasion was suggested by Sen in the paper by Senior-White and Sen (1921). He suggested that while children defæcate in the open, the beetles gain entrance into the intestines through the anus. This appears to be the probable mode of entry. But it is more likely that instead of the entry of the beetles during the period of evacuation of the child, the beetles effect their entry into the intestines during the time the child is asleep and at night. These beetles which are nocturnal in their habits, are attracted to anything foul smelling. Attracted by the foul smell emanating from the anus of a child suffering from any intestinal disorder, these beetles which are of a small size, could easily effect their entry into the rectum of the child while it is asleep. The sensation caused by the beetles trying to gain entrance into the rectum would relax the sphincter muscles and thus the beetles would effect an entry. The beetles which have been collected from children are so small that they could easily effect their entry per rectum, as easily as they come out of it. *Caccobius mutans* especially is very small.

In support of this hypothesis, we have the instance of coprid beetles of the genus *Macropocopris*, a genus which is closely allied to *Onthophagus*, which usually inhabits the droppings of the wallaby in Australia. These beetles cling to the fur of the wallaby and await its droppings, and as soon as the wallaby evacuates, they jump on to the droppings and live on them.

This is their normal life. But often enough, it has been found that they effect their entry into the cloaca of the wallaby and live inside its lower intestine. Arrow in 1920 described two species of this genus, and in describing the habits of these beetles he says "two species (of *Macropocopris*) were found by him (Dr. Illingworth) attached to the fur of wallabies, evidently awaiting the droppings which form the food of most of the group. Specimens were found even within the cloaca." In the present instance of the species of *Onthophagus* and *Caccobius*, it is very likely that the beetles, which normally live on human excrement, occasionally enter the rectum of children in a manner similar to *Macropocopris* cited above.

It has been said that generally more female specimens are collected from children than male specimens. But it should be noted that judging the sex of specimens by the presence or absence of cephalic horns is very unreliable. In *Onthophagus unifasciatus* both the male and the female are closely alike, the male having no cephalic horn. The same is also true of *Caccobius mutans*. In the case of *Onthophagus bifasciatus*, some of the males have only a very small horn and as such are not easily differentiated from the females. In cases where the males are not easily made out, the determination of the sex of a specimen is usually difficult. Arrow (1920) has found a constant feature by which the sex of the specimens could be ascertained. "A careful examination of the shape of the last ventral segment," he says, "will enable this to be done without difficulty. In the female, this segment is of nearly equal breadth throughout, whilst in the male it is always considerably narrowed in the middle."

I am greatly indebted to Mr. G. J. Arrow of the British Museum for much valuable help received from him. I should also acknowledge my indebtedness to the several medical officers mentioned in this paper for the notes and specimens they sent me.

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A NOTE ON THE BREEDING AND HABITS OF THE EYE-FLY, *SIPHONELLA FUNICOLA*, MEIJ.

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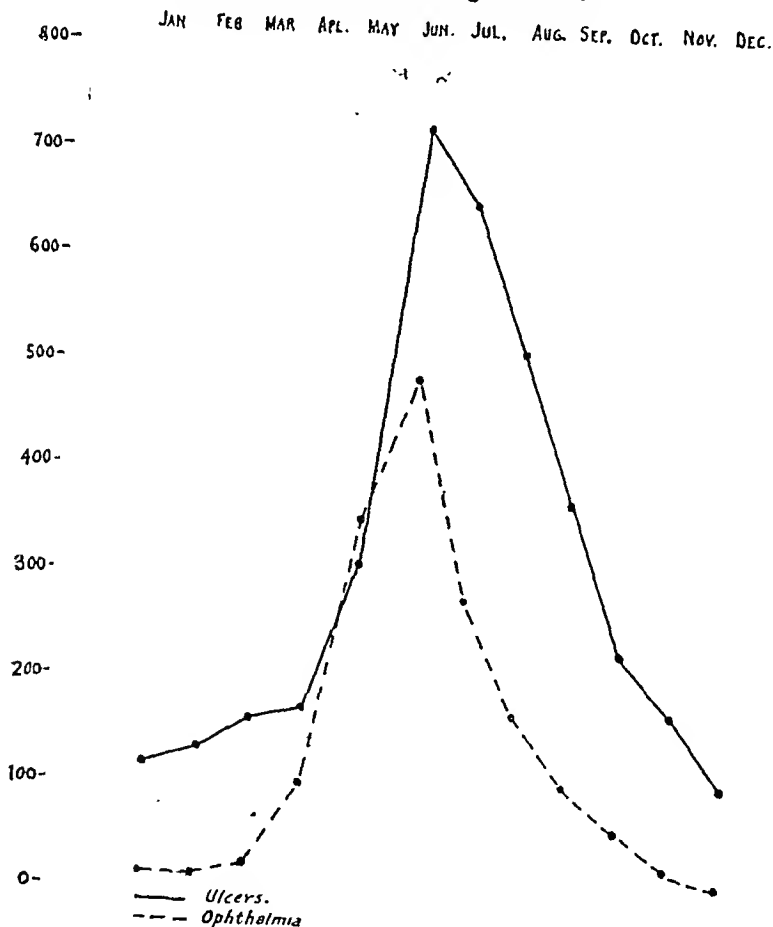
Introduction.—This year while organising a research on *Naga sore* in the tea gardens of Assam, Dr. C. Strickland, Professor of Medical Entomology in this institution, suggested that an

of the flies (*vide* Chart); and I also took up the investigation of the breeding-places of the fly.

Breeding in the laboratory.—Attempts to breed the fly in the laboratory failed, though Patton was able to raise them very easily when they were kept in ordinary test-tubes; thus he succeeded in studying the whole life-cycle. I was never able to get either egg or larva to hatch out under these conditions.

Natural breeding-places.—Patton tried to find the natural breeding-places by picking out larvæ similar to those which he had bred out in the laboratory from various places and then rearing them. As he had failed Dr. Strickland suggested the "meat-safe method." A large number of small, square mosquito nets were taken into the

Showing the incidence of *Naga sore* and *Epidemic conjunctivitis* in a Tea Estate in Assam during 1924-25.



attempt should be made to determine the natural breeding-places of *Siphonella* flies. These flies are not only a serious pest during May, June and July, but the general opinion is that they are directly responsible for the spread of *Naga sore* and epidemic conjunctivitis.

In the sequel I investigated this opinion, but the short time at my disposal did not permit me to trace the connection between these flies and epidemic conjunctivitis, except for confirming the fact that the seasonal incidence of the diseases coincided very closely with the prevalence

field but as it was found that the meshes were large enough to permit the flies to escape through them, the inside was lined all round with long-cloth, which was stitched to the net. A large number of these were spread on the following:—

1. Human faces—either in the shade or in open fields.
2. Cowdung—fresh and decomposed.
3. Horse dung—fresh and decomposed.
4. Rotten jack fruit.
5. Bark from the trunk of trees together with mounds of white ants.

6. Dung and urine and sodden earth in cattle sheds.

7. Decaying leaves and branches of trees.

8. Droppings of fowls.

9. Decaying leaves of bananas.

The nets were spread and left for two to three days when they were examined for the presence of any insect which had bred out. If a fly was present it was captured for identification. On no occasion was it found possible to leave the nets spread out for long as they were disturbed by children, cattle, jackals and sometimes by elderly people. Holes made by beetles in the curtains were common. Only dung and urine and sodden earth in cattle sheds yielded the flies and then on four occasions, the numbers which bred out being 5, 4, 3, and 1.

Habits.—A brief description of the habits of these flies is as follows:—They are very active on a hot sunny day, but none can be found when the air is cool or the sky cloudy. They rest on thatch, strings, and small strips of cane hanging down from the roof. Within two to three days the portions of the straw where they have rested may be found to have turned black and are covered over with a web inside in which some of the flies will be seen hiding. On a sunny day in the morning and in the afternoon many will be noticed resting on the grass. They feed on warm human excretions, on the exudates of ulcers of man and of animals, putrid sloughs of ulcers, the discharge from the nostrils or eyes and from the rectum of cattle, and cow and horse dung, fresh and decomposed. These flies are always found in large numbers in cow-sheds, much more so than in other rooms of the same house. There are as a rule very few in the open fields. I observed a striking fact about their distribution in Srimangal, where very few could be noticed; this is a place about two miles from the tea garden in which I was working, where I saw large numbers of the flies.

Unlike house-flies they seldom sit on ulcers but usually settle on the healthy skin surface at the margin and feed there. This no doubt protects their feet and wings from getting wet which would make their flight difficult, and may have an important bearing on the propagation of diseases through their feet and wings.

Their mouth parts are adapted for sucking and not for piercing, but the statement that "they doubtless can act as scarifying organs, enabling the fly to remove dried scab to reach serous exudation below" as mentioned by Senior-White, cannot be supported from my observations. What they have been found to do is to forcibly try to push their proboscis through a rent in the scab and thus get at the exudation below.

They could not be kept alive in the laboratory under any circumstances for more than six days.

The accompanying chart showing the seasonal coincidence of Naga sore and epidemic conjunctivitis has kindly been provided by Dr. R.

Murphy, Medical Officer, Luskerpore Tea Estates, South Sylhet, to whom my thanks are due.

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OBSERVATIONS ON THE ANTIMONY (UREA-STIBAMINE) TEST FOR KALA-AZAR.

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IN the *Indian Medical Gazette* for June 1927, Chopra, Gupta, and David described a new serum test for kala-azar. These workers observed that when certain organic compounds of antimony were brought in contact with the serum from kala-azar patients in a miniature test-tube, a thick flocculent precipitate was formed at the junction of the two; whereas with non-kala-azar sera no such precipitation occurred. This reaction of the kala-azar blood was so characteristic that these observers developed it into a test for the diagnosis of kala-azar. They tried a number of organic compounds of antimony, but showed a preference for urea-stibamine for carrying out this test. Napier (1927) extended these observations to a large number of cases and corroborated the findings of Chopra and his collaborators, but preferred weaker solutions of antimony compounds. As kala-azar cases are frequently seen in Patna, we tried this test, but at first found it somewhat confusing. During the meeting of the Far Eastern Association for Tropical Medicine held in Calcutta during December last, Col. Chopra was good enough to demonstrate this reaction to the senior author and we decided to apply it to a number of cases, both kala-azar and non-kala-azar, which came under our observation in the Hospital of the Prince of Wales' Medical College, Patna, in order to test its diagnostic value. In their original paper the authors used undiluted serum and a 4 per cent. solution of urea-stibamine, but as it was found to be giving positive results in some non-kala-azar cases, in a paper read before the Far Eastern Congress, Col. Chopra pointed out that doubtful cases could be eliminated by using a 1 in 10 dilution of serum. In his experience if the serum was diluted ten times and the test performed with this dilution precipitation occurred only with kala-azar sera and never with non-kala-azar sera. In our series of cases we used (a) undiluted serum, (b) 1 in 5 dilution of serum, (c) 1 in 10 dilution of serum; we also employed 4 per cent., 2 per cent. and 1 per cent. solutions of urea-stibamine. The tubes used were 55 mm. long and 3 mm. in diameter, and the serum was diluted with normal saline instead of

TABLE I.

No.	Clinical Diagnosis.	W. R.	UREA-STIBAMINE SOLUTIONS.								
			4%			2%			1%		
			0	5	10	0	5	10	0	5	10
1	Eczematous rash on face ..	+	-	-	-	-	-	-	-	-	-
2	Papular eruptions all over body	+	-	-	-	-	-	-	-	-	-
3	Serpiginous ulcers on legs; perforated palate.	+	-	-	-	-	-	-	-	-	-
4	Eczema on face ..	-	-	-	-	-	-	-	-	-	-
5	Dermatitis of legs ..	-	-	-	-	-	-	-	-	-	-
6 & 7	Ulcers ..	-	-	-	-	-	-	-	-	-	-
8	Dermatitis ..	-	-	-	-	-	-	-	-	-	-
9	Folliculitis ..	-	-	-	-	-	-	-	-	-	-
10	Condylomata ..	-	-	-	-	-	-	-	-	-	-
11	" ..	+	±	±	-	±	-	-	-	-	-
12	Chancres ..	-	-	-	-	-	-	-	-	-	-
13	Secondary syphilis ..	+	-	-	-	-	-	-	-	-	-
14	Syphilis suspected ..	+	-	-	-	-	-	-	-	-	-
15	" ..	+	-	-	-	-	-	-	-	-	-
16 & 17	" ..	+	-	-	-	-	-	-	-	-	-
18	" ..	-	-	-	-	-	-	-	-	-	-
19	" ..	+	±	-	-	-	-	-	-	-	-
20	" ..	+	-	-	-	-	-	-	-	-	-
21	" ..	+	+	±	-	±	-	-	-	-	-
22	" .. cerebral ..	+	-	-	-	-	-	-	-	-	-
	" W. R. + + + ; had a course of anti-syphilitic treatment.	+	-	-	-	-	-	-	-	-	-
23	W. R. + + - before : had a course of anti-syphilitic treatment.	+	-	-	-	-	-	-	-	-	-
24	Painful joints ; suspected syphilis	+	-	-	-	-	-	-	-	-	-
25	Gonorrhœa ..	+	±	-	-	-	-	-	-	-	-
26	Arthritis ..	+	-	-	-	-	-	-	-	-	-
27	Paralysis agitans ..	-	-	-	-	-	-	-	-	-	-
28	Spastic paraplegia ..	-	-	-	-	-	-	-	-	-	-
29	Hemiplegia ..	-	-	-	-	-	-	-	-	-	-
30	Myelitis ..	+	-	-	-	-	-	-	-	-	-
31	Facial paralysis ..	-	-	-	-	-	-	-	-	-	-
32	Encephalitis ..	-	-	-	-	-	-	-	-	-	-
33	Retinitis ..	-	-	-	-	-	-	-	-	-	-
34	Keratitis ..	+	-	-	-	-	-	-	-	-	-
35	" ..	+	-	-	-	-	-	-	-	-	-
36 & 37	Mitral regurgitation ..	+	-	-	-	-	-	-	-	-	-
38	Malignant endocarditis ..	-	-	-	-	-	-	-	-	-	-
39	Dilated heart ..	-	-	-	-	-	-	-	-	-	-
40	" ..	-	-	-	-	-	-	-	-	-	-
41	Asthma ..	+	-	-	-	-	-	-	-	-	-
42 & 43	" ..	+	-	-	-	-	-	-	-	-	-
44	Fibrosis of lung ..	+	-	-	-	-	-	-	-	-	-
45, 46,	Repeated abortions ..	+	+	±	-	-	-	-	-	-	-
47 & 48	" ..	+	-	-	-	-	-	-	-	-	-
49	Delivery of a still-born foetus ..	+	-	-	-	-	-	-	-	-	-
50	Alternating diarrhœa ..	+	-	-	-	-	-	-	-	-	-
51	Tumour of abdomen ..	-	-	-	-	-	-	-	-	-	-
52	Pneumothorax ..	-	-	-	-	-	-	-	-	-	-
53	Dilatation of stomach ..	-	+	±	-	±	-	-	-	-	-
54	Diabetes ..	-	+	±	-	-	-	-	-	-	-
55 & 56	Emaciation ..	+	-	-	-	-	-	-	-	-	-
57	Debility ..	-	-	-	-	-	-	-	-	-	-
58	Clavicle Fracture ..	-	-	-	-	-	-	-	-	-	-
59	K. A., enlarged spleen; aldehyde test + + + ; 3 injections of urea-stibamine.	-	+	+	+	+	+	+	+	±	±
60	K. A., enlarged spleen; aldehyde test + + + .	-	+	+	+	+	+	+	+	+	±
61	K. A., enlarged spleen; aldehyde test + + + .	-	+	+	+	+	+	+	+	+	±
62, 63, 64, 65 & 66	Healthy persons ..	-	-	-	-	-	-	-	-	-	-

N. B.—W. R. = Wassermann Reaction ; + + + = Strongly positive ; + + - = Moderately positive ; + - - = Slightly positive ; - - - = Negative ; 0 = Undiluted serum ; 5 = Diluted serum 1 in 5 ; 10 = Diluted serum 1 in 10.

distilled water. The age of the serum, which was always kept in an ice chest, varied from a few hours to 3 or 4 days.

A perusal of Table I will show that of 66 samples examined, 5 from perfectly healthy and normal individuals gave negative results in all dilutions of the serum and with all 3 solutions of urea-stibamine.

Of the 61 pathological sera, 3 were known to be from kala-azar patients and 58 from patients suffering from other diseases: 3 kala-azar cases gave marked positive reactions in all dilutions with both 4 per cent. and 2 per cent. solutions, while with 1 per cent. solutions the undiluted sera gave a positive reaction and the diluted sera gave varied results. The Wassermann reaction was negative in all 3 cases.

Of 58 sera from patients suffering from other diseases, the 1 per cent. solution gave negative results in all dilutions; the 2 per cent. solution gave similar results, except in 3 cases where undiluted sera only gave a doubtful reaction; the 4 per cent. solution on the other hand gave with (a) undiluted serum, 4 positive and 3 doubtful results; (b) 1 in 5 serum, 5 doubtful results; (c) 1 in 10 serum, all negative reactions.

The Wassermann reaction showed 25 strongly positive, 1 moderately positive, 4 slightly positive, and 28 negative reactions. A positive Wassermann reaction did not appear to influence the reaction in any way. Only 2 samples with a positive Wassermann reaction gave a slightly positive urea-stibamine reaction in undiluted serum, while the same sera gave doubtful reactions in 1 in 5 and negative in 1 in 10 with a 4 per cent. solution: 2 samples with negative Wassermann reaction gave similar results as above. It appears, therefore, that 1 in 10 diluted serum with 4 per cent. solution of urea-stibamine gives better results and minimises the possibilities of error, especially in well-developed cases of kala-azar.

We next took up a series of 24 cases (Table II) to study the comparative serum response to the formol gel and urea-stibamine tests. All 13 cases from the kala-azar ward gave a positive reaction with a 4 per cent. solution in all dilutions, and varied in reaction with 2 per cent. and 1 per cent. solutions. Ten cases showed a positive formol gel reaction; 3 negative formol gel cases had a full course of treatment. Not one of the 11 non-kala-azar cases taken from the general ward gave a marked positive reaction with the formol gel or antimony (urea-stibamine) test. A doubtful reaction was, however, obtained in 2 cases with formol gel and in 5 cases with 4 per cent. urea-stibamine solution; 2 of these 5 cases were negative at 1 in 10 dilution.

CONCLUSIONS.

From the series of cases studied by us we feel justified in drawing the following conclusions:—

1. A 1 in 10 dilution of serum gives a negative antimony test in all non-kala-azar cases.

2. A dilution of 1 in 10 of serum gives better results than undiluted serum or a dilution of 1 in 5, in differentiating kala-azar from non-kala-azar cases.

3. A 4 per cent. urea-stibamine solution gives more positive results than weaker solutions.

4. The factors responsible for a positive Wassermann reaction do not appear to influence this test.

5. The reaction appears to be a specific one for kala-azar serum.

6. The reaction lasts longer than the formol gel reaction after a course of treatment.

Our grateful thanks are due to Lt.-Col. H. R. Dutton, I.M.S., Professor of Medicine, Prince of Wales' Medical College, Patna, for permitting us to carry out this investigation in the Patna General Hospital.

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ELECTRO-CARDIOLOGY AND SOME OBSERVATIONS ON INDIANS.*

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THIS evening I shall lay before you the highly technical subject of electro-cardiology. It was by the invention of the string galvanometer by W. Einthoven, a Dutch physiologist in 1901, that the study of the electrical variations associated with the activity of the various chambers of the heart was made possible. In Calcutta this subject has been introduced only lately, as the electro-cardiographic apparatus was obtained for the Medical College Hospital in 1925 by the personal efforts of the recent Principal, Col. Barnardo, who is foremost in maintaining that the electro-cardiograph is essential for the modern diagnosis and treatment.

Importance of Electro-cardiology.—During the last thirty years, largely owing to the work of Sir James Mackenzie, Sir Timothy Lewis, Professor Starling and their pupils, the attention of the medical profession has been particularly focused on the study of the cardiac

* A paper read before the Medical Section of Asiatic Society of Bengal on the 20th February, 1928.

muscle. It is upon the condition of the muscles of the heart more than upon the condition of the valves, that the ultimate basis of the patient's outlook for life depends. Till recently the diseased state of the valves used to draw our attention to the heart and was the only valuable aid in diagnosis and prognosis of diseases of the heart; but the indication of the cardiac efficiency really rests with the power of the cardiac musculature, which indeed determines the capability of the patient for work and the prognosis of the case. How often, in the absence of any obvious disease of the valves, is our attention not directed to the heart and we are led to neglect a condition of the cardiac muscle which certainly is rather more important and more dangerous than a diseased condition of the valves. From the electro-cardiogram we can have definite information of the degree of damage to the cardiac muscle.

Again, in rheumatic infection not only the valves but also the cardiac muscles are involved in the pathogenic process. This is corroborated by the presence of Aschoff's bodies in the heart muscle, coincident with the implication of the valves. Hence not only the signs of valvular disease but also an idea of the condition of the cardiac muscle is necessary for every cardiologist. Some go so far as to say that close differentiation between the various valvular lesions has only an academic value, and after all the absence of loss of compensation which is dependent on the integrity of the cardiac musculature is the chief factor.

Though there are three main structures in the heart which may produce symptoms, it is the cardiac muscle which is the principle factor.

1. *The conducting system of Tawara or the genetic system of Mackenzie* is concerned with every activity of the heart. Any impairment of this structure is of importance in so far as it interferes with the proper action of the heart muscle. The electro-cardiograph is the instrument for definitely diagnosing such defects.

2. *The valves* are the second structure that give rise to symptoms. Any damage to them is of importance only in so far as it embarrasses the cardiac muscle in its proper work.

3. The third structure is the muscle, and the chief problem resolves itself into the finding out the integrity of the muscle and the state of its efficiency.

There may be variations in the rate and the rhythm of the heart, but these are without any prognostic significance unless they embarrass the proper working of the heart muscle. Information about cardiac muscle is best obtained by the electro-cardiograph, hence the great importance of electro-cardiology.

There are certain features of the normal and abnormal heart beat which can be best studied by the electro-cardiogram. From it one can easily study the time of propagation of the wave of excitation and contraction either through the auricle or the ventricle; moreover, the interval

between the auricular and the ventricular complexes of the tracing gives a very accurate measure of the time of transmission of the impulse through the bundle of His. Any abnormal point of origin of the stimulus for contraction (e.g., ectopic beats) or any abnormal direction of propagation of the wave (e.g., bundle lesion), will produce a definite change in the form of the tracing and will thus indicate the abnormal condition of the musculature or the conducting system. Hence the special value of the electro-cardiogram in diseases affecting the cardiac muscle and the conducting system.

It is to be noted, however, that the extent of movement shown in an electro-cardiogram is not in proportion to the strength of the contraction. It is an accurate representation of the difference of electric potential between the two electrodes as the stimulus travels along its normal or abnormal paths.

A few preliminary anatomical and physiological considerations may not be out of place here. It is well known that the heart continues to beat even when removed from the body, thereby indicating that there are within the heart certain structures which possess the property of causing the various chambers of the heart to contract in an orderly fashion.

Lately several important discoveries regarding the structure of the heart have been made in close succession. For instance the discovery of the auriculo-ventricular bundle by His and Stanley Kent in 1893, and of the auriculo-ventricular node and the branches of the auriculo-ventricular bundle, one going to each ventricle, by Tawara in 1906, and of the exact location of sino-auricular node by Flack and Keith in 1907 completely changed our conception of the working of the heart.

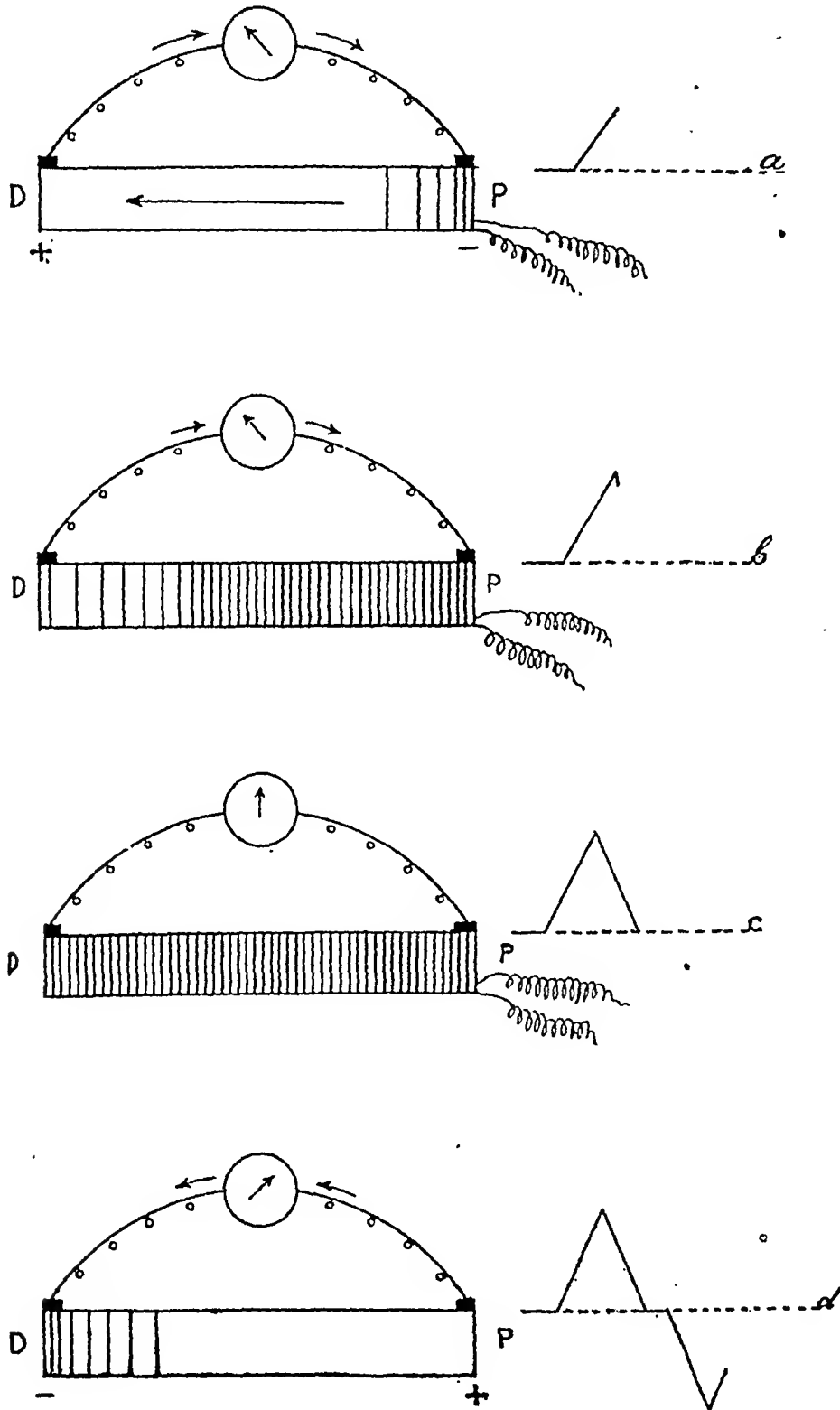
The sino-auricular node is situated at the junction of the superior vena cava with the right auricle. The cardiac impulse is said to be produced by a biochemical action of the cells in the node, which are the remnant of the primitive tissue from which the heart was developed. The products of these cells pass from one cell to another, and when they reach the cells attached to the muscles they have accumulated in sufficient strength to start the auricular activity, and the two auricles are involved in simultaneous contraction. The cardiac impulse then reaches the auriculo-ventricular node, situated near the bottom of the right auricle, and passes down the bundle of His and its branches to their final ramifications amongst the Purkinji's fibres. The impulse is thus conducted to the inner surface of the two ventricles and the contraction spreads from the endocardial surface through the cardiac muscle to its pericardial surface.

It is well known in physiology that the activity of any living tissue is accompanied by the production of variations in the electric potential, which can be made manifest by suitable instruments; consequently the activity of all muscular

tissue is associated with the production of electrical energy; i.e., when a portion of muscle passes into a state of activity, it becomes relatively negative to the portion of the muscle at

experiment; when a strip of muscle, preferably a muscle with parallel fibres, is connected with a delicate galvanometer by two non-polarised electrodes placed at its two ends, no electrical

FIG. 1.



rest. This is called the *action current* of the muscle by physiologists, and is the fundamental basis of electro-cardiography. Sir Timothy Lewis has clearly demonstrated this by a simple

variation is detected by the galvanometer if the muscle be uninjured and at rest. When such a muscle is stimulated at one extremity, however, an electrical disturbance passes as a wave

from the stimulated end (i.e., from the portion of the muscle brought into activity) to the portion of the muscle at rest. (This will be made quite clear from Fig. 1.)

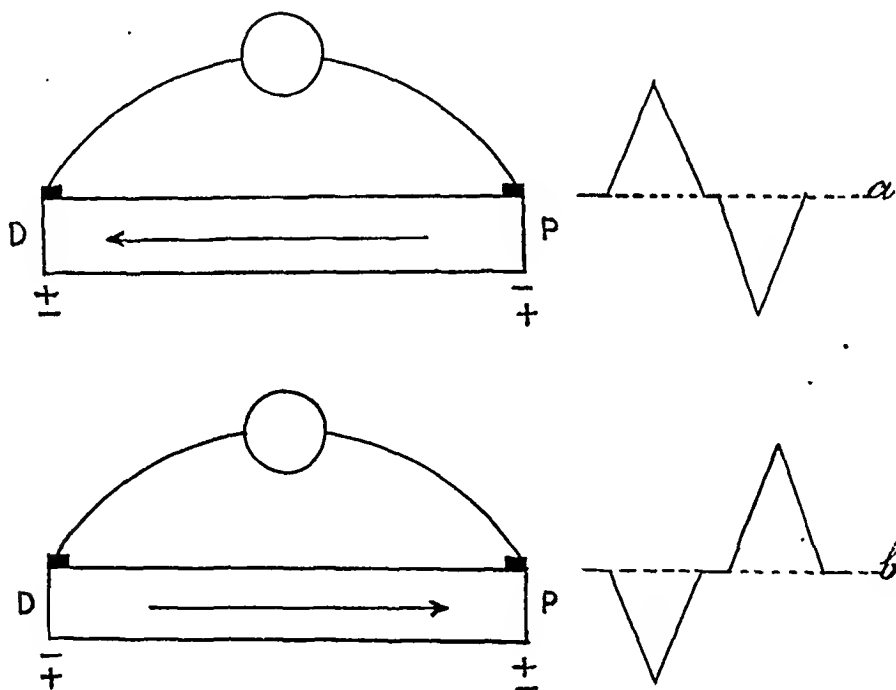
When a strip of muscle PD is stimulated; one end P, it becomes active and so relatively negative to the other end D, which is inactive at that particular moment, and the galvanometer indicates the presence of a current by its swing in one direction (Fig. 1a). As the wave of excitation travels along the muscle from P to D, when it arrives at D the highest point of deflection is reached (Fig. 1b). A moment later the whole muscle is in activity and becomes iso-electric and the galvanometer swings back to its original position, showing that no current is flowing through it (Fig. 1c). A little later when the activity begins to subside at P, D remains active, and so becomes relatively negative to P, and the galvanometer swings in the opposite direction; when the deflections of the galvanometer are recorded, and a *diphasic* curve is produced (Fig. 1d).

highly complex nature, with the muscle fibres passing in various directions, the graphic record of the action current of the whole heart consists of a series of complicated waves for each heart beat; a resultant of the action currents of the muscle fibres of the heart.

Waller showed in 1887 that when any two areas of the body including the heart between them are properly led off and connected with a suitable and delicate galvanometer, the minute electrical currents generated by the cardiac activity could be easily detected and recorded, and that it is unnecessary that the heart should be exposed for recording them.

In his experiments Waller used the capillary electrometer, which, though very sensitive to indicate the presence of minute electrical currents, was quite inadequate to give a faithful record of the quickly varying currents produced during the contractions of the chambers of the heart. He was unable, however, to correlate the different electric curves with variations in the action of the different chambers of the heart.

FIG. 2.



If the strip of muscle be stimulated at D (instead of at P as in the first part of the experiment) and the wave of excitation travels along the muscle in the opposite direction, a diphasic curve is produced but its phases are inverted (Fig. 2b). Hence the form of the curve produced is governed by the direction in which the wave of excitation travels through the muscle. It is now generally accepted that the wave of excitation precedes the visible wave of contraction and there is a definite relation between two (in a muscle), but for practical purposes both are regarded as part and parcel of one and the same process. As the cardiac musculature is of a

The invention of the string galvanometer by Einthoven in 1901 removed this want. He succeeded in correlating the various electric curves recorded by the string galvanometer with the activity of the different chambers of the heart, both healthy and diseased.

Electro-cardiology commenced with the invention of the string galvanometer, and the electrocardiograph constitutes its practical application for clinical purposes.

The principle of the string galvanometer is based on the fact that whenever a current of electricity passes through a magnetic field at right angles to the lines of force, it tends to be

deviated to one side or the other according to its direction. The extent of deflection varies directly with the intensity of the current passing through it, the magnetic fields remaining constant.

In the electro-cardiograph, the action currents of the heart are led (by connecting the extremities of the subject in accordance with the standard leads) through an exceedingly fine silvered quartz fibre, suspended between the poles of a powerful electro-magnet in its magnetic field. Strong light from a Pointolite lamp or arc light is concentrated on this fine fibre by a condenser. The shadow of the fibre, magnified by a microscope, is projected on to and recorded photographically on a sensitive plate or film, moving at a fixed rate.

There is an appliance for indicating the time taken by each wave of the tracing, which in all modern electro-cardiographs is a rotary time-marker worked by an electro-magnet and a vibrating bar. With its help the beam of light falling on the camera (containing the sensitive plate) is interrupted at intervals of $1\frac{1}{25}$ th second; and vertical lines are produced in the

in the origin and propagation of the wave of excitation.

The time occupied by each wave can be calculated from the number of vertical lines covered by each: the interval between the two vertical lines represents $1\frac{1}{25}$ th of a second. The horizontal lines are 1 mm. apart. The height of an excursion from the upper border of the base line is the measure of the voltage producing it.

Normal Electro-cardiogram.

In each cycle of a normal electro-cardiogram there is a small upward wave known as the "P" wave. This is followed after a certain interval by a series of upward and downward deflections called the "QRS" group of which the upward deflection is known as "R." There may be a downward deflection preceding "R" known as the "Q" wave, and another downward deflection after "R" called the "S" wave. Both Q and S or either of them may not always be present even in tracings taken from healthy individuals. The "QRS" group corresponds with the wave of excitation through the ventricle. Following the "QRS" group there is a short interval producing

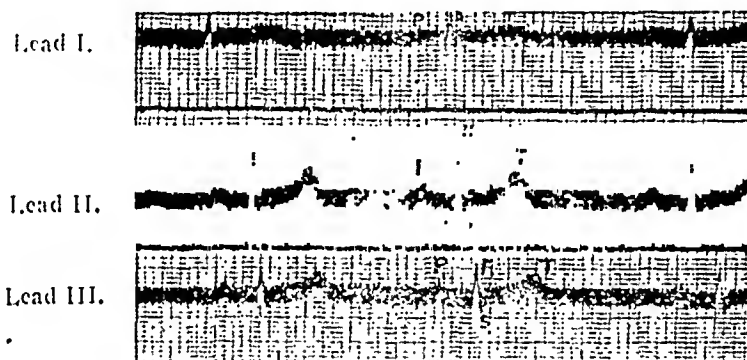


FIG. 3.—Normal Electro-cardiograms. European. Aged 28 years.

tracing of certain intervals which represent $1\frac{1}{25}$ th second. Thus the time occupied by each phase of the electro-cardiogram can be easily and accurately measured.

Any pair of areas of the body which is connected with galvanometer is called a "lead" or "derivative." Almost every different lead shows a different electrical current from the same heart. It becomes necessary therefore to follow a definite method so that records taken from different patients may be compared. The following leads from the extremities have been universally adopted, viz.:—

- | | | |
|------------------------|----|---------|
| Right arm and left arm | .. | Lead I. |
| Right arm and left leg | .. | " II. |
| Left arm and left leg | .. | " III. |

In following this standard method of connecting the patient with the galvanometer, we must have the same direction in each lead each time the record is taken; thus the work of comparing records taken from the same patient at different times is facilitated. Any wave taking an abnormal direction indicates an abnormality

a horizontal or nearly horizontal base line, ending in an upward generally broad deflection called the "T" wave. Each cardiac cycle of a normal electro-cardiogram consists of an *auricular-complex*, from the rise of the "P" wave to the beginning of the "QRS" group, and a *ventricular-complex* from the beginning of the "QRS" group to the end of the "T" wave.

The "P" wave represents the difference of electric potential produced during the spread of the wave of excitation through the auricle from its origin at the sinus node, i.e., auricular systole. The ventricular complex represents the ventricular systole. The P-R interval marks the length of the time taken by the impulse to travel from the auricle to the ventricle, i.e., the auriculo-ventricular conduction time or the A-V interval.

There are differences of opinion as to the interpretations of the "QRS" group and "T" wave.

There is practically no marked difference in the "P" waves in the tracings of apparently healthy Europeans and Indians.

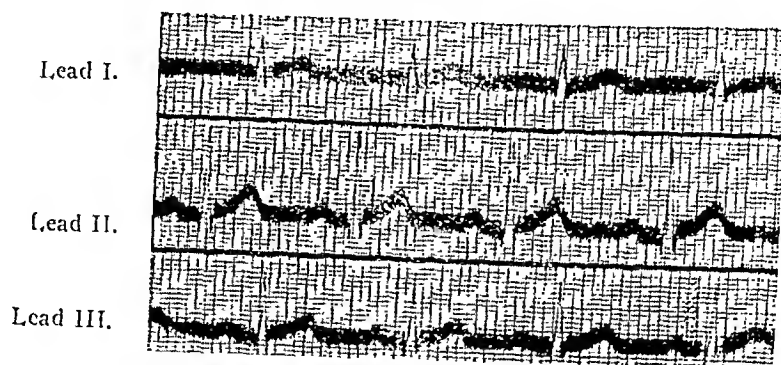
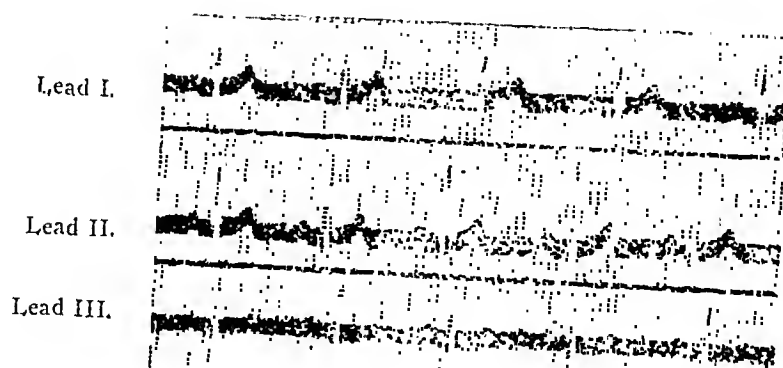
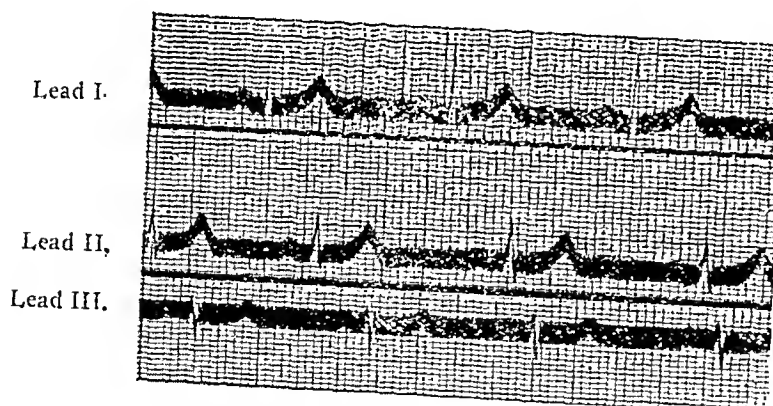
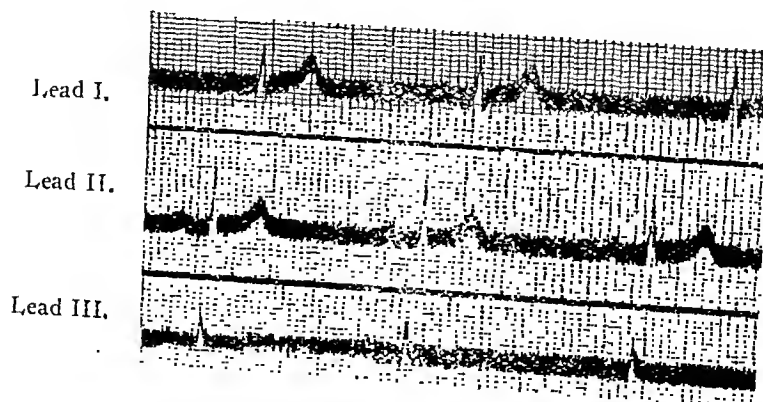


FIG. 4. Bengali. Aged 28 years. Muscular.

FIG. 5.—Normal Electro-cardiograms, Indians (Bengali).
Aged, 90 years, 6 months. Height, 5'-5½".
Weight, 9 st. 5 lb. Chest girth, 35"FIG. 6.—Punjabi. Aged 31 years. Height, 5'-3½".
Weight, 9 st. 1 lb. Chest girth, 34½".Fig. 7.—Aged 30 years. Height, 5'-6½".
Weight, 10 st. 10 lb. Chest girth, 34½".

The P-R interval is generally found to be slightly longer in Europeans. The average P-R interval in the Indians (Bengalis), is 0.14—0.16 second, whereas in Europeans it is generally 0.16—0.18. The duration of the ventricular systole, as measured by the R-T intervals of the electro-cardiograms, is distinctly greater in the Europeans. The average ventricular systole of Europeans (as given in books) varies from 0.34—0.42, but the average of the few cases I have done here is 0.34—0.38 second, whereas the average for the Bengalis is 0.28—0.30. The latter figure is reached only by a few muscular subjects. There is a marked difference here. How can this be accounted for?

It is well known in electro-cardiology that in cases of marked ventricular hypertrophy the duration of the ventricular systole is increased; so much so that tracings of such cases at times can only be differentiated with difficulty from tracings of bundle-branch lesions by other distinguishing factors. Thus it is concluded that the increase in the ventricular mass causes increase in the duration of the ventricular systole. Consequently decrease in the ventricular mass decreases the duration of the ventricular systole. This lower reading may be accounted for by the less muscular mass in the ventricles of Bengalis. From the weights of hearts of cases of accidental death it has been ascertained that Europeans' hearts weigh on an average about 12 ozs., whereas the Bengali's heart's weight varies from 7½ to 9 ozs., of which the former figure represents the weights of female hearts. (The figures are taken from the records of the Calcutta Police Morgue.)

In the few cases examined by me there is not much difference in the electro-cardiograms of the Hindus and Mohamedans of Bengal.

The ventricular systole time of Punjabis and Nepalis (though only a few cases were observed) approaches very closely to the European systole duration of the ventricles, being 0.34—0.36 second, and so higher than the Bengalis.

CASES.

Sinus Arrhythmia.—(Fig. 8), D. P. Chowdhuri, a boy of 11, had an attack of influenza about 8 months previously. During convalescence once he became almost unconscious and after that his pulse used to be irregular; when he came for electro-cardiography his pulse was markedly irregular, 100 per minute. There was no abnormal auscultatory sign.

There is no abnormality in the auricular and ventricular complexes. The irregularity is in the duration of the diastole (T-P interval), showing the impulse for cardiac contraction originating irregularly in the sinus node.

Extra Systole.—(Fig. 9), European male, aged 42. Nothing abnormal except irregularity of the pulse.

The electro-cardiogram shows the presence of ventricular extra-systole E.S. in lead II—by the abnormality of the form of ventricular complex and the compensatory pause.

Auricular Flutter.—(Fig. 10), N. J., a Mahomedan male, aged 35, was admitted to the Additional Physician's ward of the Calcutta Medical College Hospital with symptoms of heart failure.

Previous History:—About seven weeks prior to his admission he noticed swelling of his legs and began to feel breathless on exertion. The heart dulness was increased, mostly transversely; the apex beat at the 6th intercostal space 1½" to the left of the mammary line; diastolic and pre-systolic murmur at the apex.

Pulse irregular, 64 on lying down, but on sitting up rose to 85 per minute.

Diagnosis:—Mitral stenosis and myocarditis.

The electro-cardiogram shows continuous regular undulations of the base line, in leads II and III, characteristic of auricular flutter. The P waves are inverted and there are three P waves to one ventricular complex which is superposed on them—showing a promiscuous auricular contraction having no relation to the ventricular systoles. The tracing was taken when the patient was fairly well on the way to recovery.

Auricular Fibrillation.—(Fig. 11), K., Mahomedan male, aged 18, tram driver by occupation, was admitted to the Additional Physician's ward with dyspnoea, cough, ascites and weakness.

Previous History:—Occasional attacks of fever lasting 7 or 8 days for the last four years. Dyspnoea and ascites with enlargement of the liver and spleen for the last six months. Size of the heart increased transversely—apex-beat irregular, diffuse, in the 5th left intercostal space ½" external to the mid-clavicular line. Pre-systolic and systolic murmur at the apex. (The 2nd sound at the apex was often accompanied by a murmur.) Pulse very irregular, rate 80 in the recumbent position, but on sitting up rises to 88 per minute. There were a few rhonchi in the lungs, but no abnormality of the arteries. Albumen was present in the urine without casts.

Diagnosis:—Double mitral disease with myocardial degeneration.

The electro-cardiogram shows absence of regular P waves with irregular undulation of the base line varying in size and form characteristic of auricular fibrillation. The tracing also shows ineffective, irregular, promiscuous origination of auricular contractions without any relation to the ventricular systoles.

Myocardial Damage.—(Fig. 12), J. W., Anglo-Indian male, aged 15, was admitted to Col. Sandes' ward, Medical College Hospital.

Previous History:—About three months previously he had pain in the pericardial region after finishing a football match.

Complaints:—Palpitation and pain in the præcordial region whenever he plays games or runs races.

Examination:—Apex beat in the 4th interspace about 2½" from the mid-sternal line. Heart increased towards left. Pulse regular, of good volume and tension, 64 per minute. Functional test causes no discomfort except on running as stated above.

Auscultation:—Revealed no abnormality, arteries good, urine no albumen.

Diagnosis:—Hypertrophy of the heart.

Electro-cardiogram.—P wave—markedly bifurcated in leads II and III indicating asynchronism of the auricles. QRS group notched, and its duration increased, 0.16 sec., indicating myocardial damage (this cannot be definitely diagnosed by any other means). The tracing also shows right ventricular predominance. (The time marker stopped working when the tracing of the lead III was being taken.)

Ventricular Predominance.—(Fig. 13). By the electro-cardiographic method one can investigate the condition of the cardiac musculature as well as that of the bundle-branches. It has very little to do with valve lesions directly. It is only when the valve lesions affect the mass of the cardiac musculature that they influence the form of the electro-cardiographic tracing. For instance, in cases of disease of the aortic valves there is

increase of the mass of the left ventricle and electrocardiograms show left ventricular predominance.

In cases of mitral stenosis of the right side of the heart the cardiac muscle hypertrophied and right

ventricular predominance is shown in electrocardiograms; as well as auricular hypertrophy (which cannot be diagnosed by any other means).

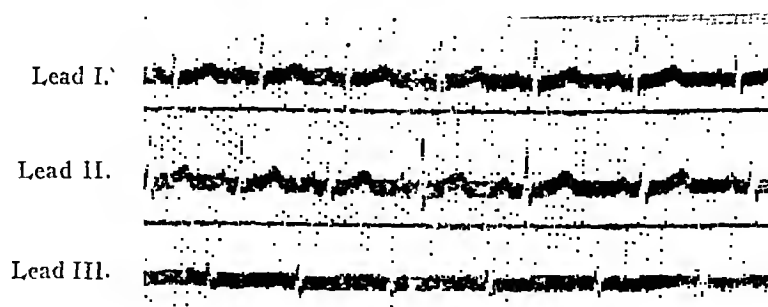


FIG. 8.

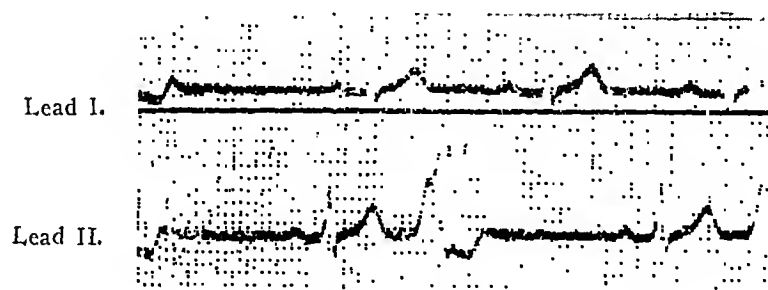


FIG. 9.

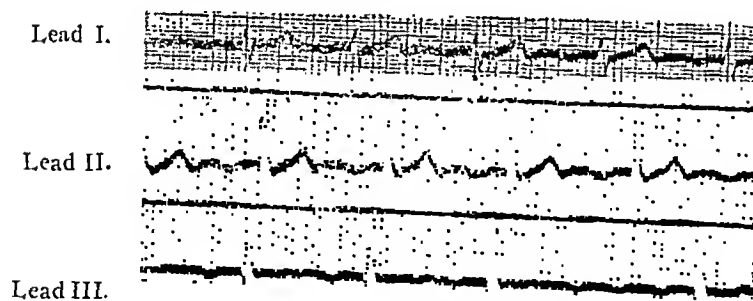


FIG. 10.

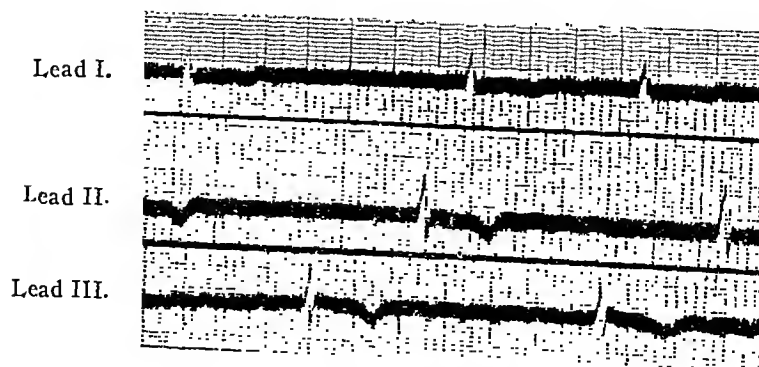


FIG. 11.

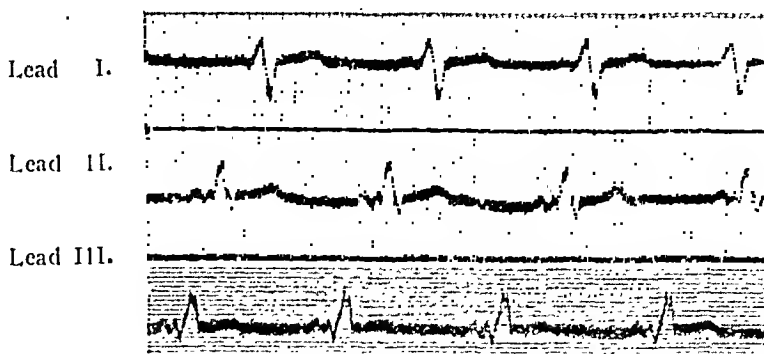


FIG 12

Mitral regurgitation also produces secondarily right ventricular hypertrophy, after overtaking the left ventricle, but early cases of mitral regurgitation show left ventricular predominance.

which I received from him in this connection. He not only obtained this instrument, overcoming various difficulties, but took particular care in

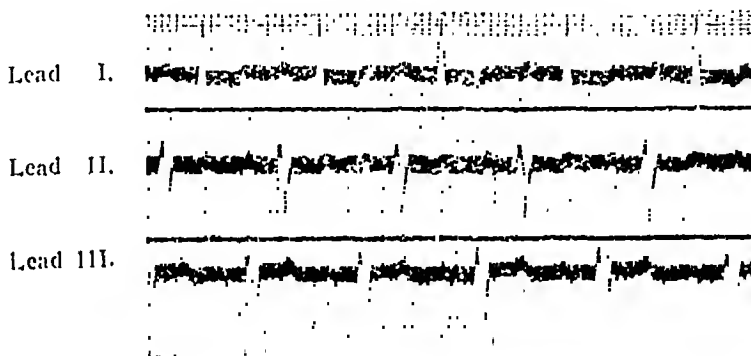


FIG. 13.

In Fig. 13 the R wave in lead I is the largest of all R waves in the three leads, and consequently is larger than the R wave in lead III. There is no S wave in lead I, but the S wave in lead III is very large and even larger than the R, in lead I. In the lead II S is larger than R.

Right Ventricular Predominance.

many details in connection with its installation and working.

I also desire to express my gratitude to Col. A. C. McGilchrist for his valuable advice in working the apparatus, as well as to Pro-

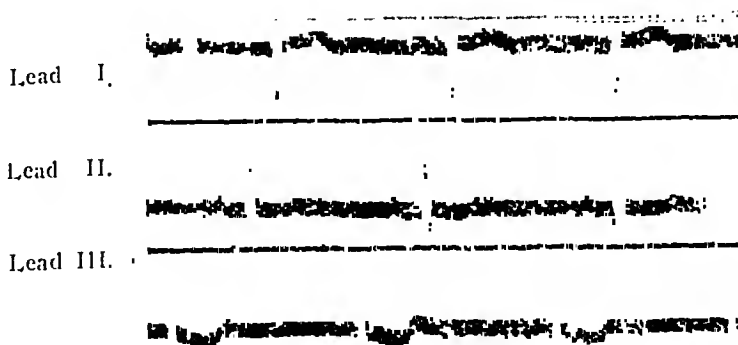


FIG. 14.

The R wave is the largest in lead III but there is no S wave; whereas in lead I the R wave is small but the S wave is very large.

Before concluding this paper I should be failing in my duty if I did not record my gratitude to Col. Barnardo. I take this opportunity of offering my thanks to him for the great help

fessor T. Kar for helping me in this connection.

My thanks are also due to Major J. C. De. Police Surgeon, Calcutta, for the very valuable help I received from his records at the Police Morgue, Calcutta.

ANÆSTHESIA OF THE ABDOMEN.

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Assistant Surgeon, Mandalay Hospital.

IN connection with the article in this subject by Major H. E. Murray, M.B., Ch.B. (T.C.D.), in your issue of March 1928, it appears to us that an account of the anæsthesia of the upper abdomen as practised in the Mandalay Hospital might be of interest.

The only anæsthesia now used here for surgery of the whole abdomen is "twilight sleep" plus "split spinal." This has been used for gastric operations, splenectomy, nephrectomy (by the anterior route) and all other operations in the upper and lower abdomen.

The technique is as follows:—

(i) *Twilight sleep*.—The patient is placed in a dark quiet room with a towel over the eyes. One and a half hours before operation a hypodermic injection of morphia gr. $\frac{1}{4}$, scopolamine gr. $\frac{1}{200}$, is given.

Half an hour before operation another hypodermic of scopolamine gr. $\frac{1}{100}$ is given. The patient is brought into the theatre 10 minutes before the operation with a towel over his face.

(ii) *Split spinal*.—Ten minutes before the operation the patient is turned on his side on the operation table and after careful skin sterilisation, 1 c.c. of a 1 per cent. solution of novocaine is injected into the skin and subcutaneous tissues over the intervertebral space between the 12th dorsal and 1st lumbar vertebræ and also over the space between the 4th and 5th lumbar vertebræ.

One c.c. of Stovaine-Billon solution (May and Baker) containing 0.05 gram of stovaine in glucose, is injected intrathecally between the 12th dorsal and 1st lumbar vertebræ, and 1 c.c. between the 4th and 5th lumbar.

Care must be taken that the cerebro-spinal fluid flows freely before the stovaine is injected. If only an occasional drop comes, the anæsthesia will probably fail.

The prick of the needles used in giving the spinal anæsthesia sometimes wakes the patient. The patient is then told that he will be given chloroform. A few puffs of chloroform from a Junker's inhaler puts him to sleep again, and the operation is then finished without any more chloroform. A few whiffs more are given if the patient wakes up at any time during the operation, and sleep is again immediately induced. Two syringes must be used for the stovaine so that the 2 c.c. ampoule can be divided accurately into two.

This method is, in our opinion, the ideal method of anæsthesia for all abdominal

operations. The patient lies peacefully asleep with his eyes covered during the whole operation, and muscular relaxation is perfect. One is never at the mercy of the anæsthetist, and the sewing up of an abdomen is as easy as opening it.

The patient gets back to bed while still asleep, sleeps on for two or three hours, and there is none of the vomiting and distress, to say nothing of the strain thrown upon stitches, caused by the vomiting after a general anæsthetic.

We usually reckon on 45 minutes perfect anæsthesia, but in one case with extensive abdominal injuries which involved amongst other things the removal of the right kidney, the patient was still sleeping 1 hour 25 minutes after the injection, while stitches were being put in $1\frac{1}{2}$ inches below the ensiform cartilage.

A further advantage of this method is that it can be used in cases where chloroform is contra-indicated. We find that there is no danger in putting the patient in the Trendelenburg position immediately after the injection. Normally of course the patient is only put in this position after the abdomen has been opened.

COMPLICATIONS.

Headache.—Patients sometimes complain of a slight headache, which lasts a day or two.

Temperature.—There appears to be a slight rise of temperature, lasting a day or two, which is due to the spinal anæsthesia and not to the operation.

Malaise, nausea and vomiting.—Very rarely occur on the operating table. Diffusible stimulants soon put this right.

Hot water bottles.—Are extremely dangerous even if properly covered. An early case of ours lost half her foot from this cause. The best plan is to forbid them, either during or after the operation.

NOTES ON A CASE OF "BLACK TONGUE."

By RICHARD GREEN, M.B., D.S.

(From the Institute for Medical Research

Kuala Lumpur, F. M. S.)

THE following case of "black tongue" was referred for further diagnosis by Dr. G. A. Dinlop of Kuala Lumpur, who had noticed yeast-like organisms in smears from tongue scrapings.

Details of Case.—Mr. C. L. W., European, act. 36, presented himself for examination showing the following interesting abnormality:—The dorsal surface of the tongue was covered with moist black fur which had been present for the past two months.

Previous History.—There had been no severe illness at any time, but three years ago the patient had had a similar pigmentation of the tongue which had lasted for three or four months.

General Examination.—Thin, somewhat nervous type of individual, otherwise healthy;

occasional sufferer from indigestion; stating that at the present time he was overworking and smoking too much. No medicines containing iron were being taken to account otherwise for the condition.



A.—Microphotograph of yeast-like organisms from a 48 hours culture. X—470.

Condition of the Tongue.—The dorsal surface of the posterior two-thirds of the tongue showed greatly hypertrophied and elongated filiform papillae which were dark brown to black in colour, giving the tongue the appearance of being carpeted with moist black fur.



B.—Microphotograph of yeast-like organisms within epithelial cell from a tongue scraping. X—470.

Patches of these papillae could be easily and painlessly removed with forceps leaving a smooth surface which did not bleed.

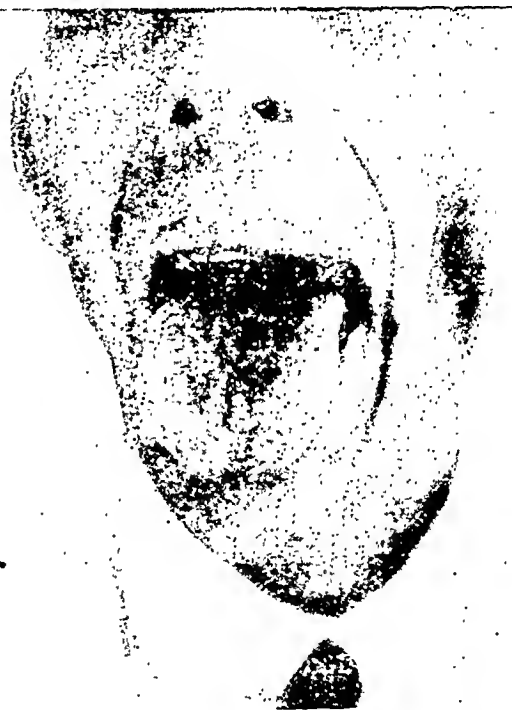
Microscopic Features.—The epithelial cells of the blackened hypertrophied papillae were found to be covered 4 or 5 deep with yeast-like organisms varying in length from 2μ to 5μ and staining Gram positive. A number of budding forms were seen and some reproduction appeared to be taking place within epithelial cells.

Cultural Characteristics of the Yeast-like Organism.—Various culture media were inoculated with scrapings from the tongue, and the organism seen on and apparently within the epithelial cells grew after 24 hours incubation at 37°C . in the form of small white opaque pin-head colonies which were later subcultured on other media.

The most favourable solid media for its growth were found to be dextrose and maltose agar. On both of these it grew readily at room temperature.

After one month's growth on Sabouraud's maltose agar the culture assumed a dark brown colour similar to that observed on its original source, the tongue.

Apart from the favourable media mentioned, portions of the culture were kept on sterile plaster-of-Paris blocks in Petri dishes containing



sterile water in order to estimate the various methods of reproduction of the organism under somewhat unfavourable conditions.

During its growth under these conditions no mycelial elements were found at any time, no ascospores were formed, no down growths into the media were observed, and reproduction appeared to take place by budding only.

Fermentation tests showed the formation of acid and gas in glucose and laevulose.

Bacteriological Diagnosis.—Castellani's classification of the yeast-like fungi is as follows:—

(a) Asci present—

- 1 Mycelium absent = Saccharomyces.
- 2 Mycelium present = Endomyces.

(b) Asci absent—

- 1 Mycelium absent = Cryptococcus.
- 2 Mycelium present = Monilia.

The organism isolated from the tongue scrapings showed on culture the absence of both asci and mycelium.

It was therefore regarded as one of the *Cryptococcus* group, and would appear to correspond with a yeast-like organism described by Castellani and Chalmers (1919) and Brumpt (1922), this organism being found by Lucet (1901) in cases of "black tongue."

Discussion of Diagnosis.—A brief extract from Castellani and Chalmers (1919) is given as follows:—

"*Cryptococcus lingua-pilosa* Lucet (1901), found by Lucet and others in cases of so-called "black tongue." It appears on the surface of

physiological salt solution also used as a control. Wright's capillary tube technique was used in performing these agglutination tests.

Treatment.—The condition disappeared within a few days on painting the tongue with Lugol's iodine solution diluted 1 in 5 with water and the internal administration of a simple alkaline gentian mixture. The hypertrophy of the papillæ rapidly decreased and the black coating faded through varying shades of dark brown to light brown to normal colour.

Comments.—One similar case occurring in a medical student was seen by the writer in Australia about seven years ago, but no bacteriological examination was made at the time.



hypertrophied lingual papillæ in the shape of roundish bodies with double contour 3μ to 6μ in diameter. Grows easily on sugar media. Glucose and lævulose fermented. Attempts to reproduce the disease have failed. Guégan and Thâon believe that this fungus becomes pathogenic only when associated with *Nocardia lingualis*."

In a case of monilia infection of the tongue Zeisler (1927) has reported that the organism was agglutinated by the patient's serum at a dilution of 1 in 4,000.

In the case of C.L.W., regarded as a cryptococcus infection, an emulsion of a 24 hours subculture of the yeast-like organism from the tongue was used in performing an agglutination test with the patient's serum, two other sera from healthy individuals being used as controls.

The organism was found, however, to form clumps after two hours, not only in the patient's serum and the two control sera, but in the



Castellani and Chalmers (1919) report other cases of "black tongue" said to be due to one of the higher fungi, *Rhizopus niger*, found by Ciagliniski and Hewelke in cases of black mycosis of the tongue.

Twelve cases of "black tongue" are reported in the Nigerian Annual Medical Report (1926), but in these the coating was membranous and at first dry and white, later turning to black. Constitutional disturbances and fever accompanied the condition which cleared up at the end of five days, when spirochaetes of relapsing fever type were found in the patient's blood. In this series of cases the organism found on the tongue is stated to be a fungus "probably of the oidium type."

In the case of C.L.W., regarded as deserving of report at some length, there were no constitutional symptoms associated with the "black tongue."

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Nigerian Annual Med. Report, 1926, p. 130.

STANDARDS FOR MACLEAN'S UREA CONCENTRATION TEST IN HEALTHY INDIANS.

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THE value of Maclean's urea concentration test in Europe has become widely recognised, and its application to diseased conditions of the kidney in India has been very general. But in the interpretation of the degree of urea concentration in any given case at the bedside we were handicapped by a want of knowledge of the standard of urea concentration by the healthy kidneys of the normal Indians, after the usual oral dose (15 grams) of urea. Was the standard for Indians the same as the standard for Europeans, differing as these two big groups do so largely in their daily dietary, and hence presumably differing in the strain daily thrown on the kidney throughout a life time?

1. Maclean has already published in his "Renal Disease" the percentage concentration of urea, using the described technique of his test in healthy Englishmen in three age groups as under:—

TABLE I.

Urea concentration test in healthy Englishmen.

		Ages.	Urea Concentration.
Group I	..	15—25 years	3.00%
Group II	..	26—45 years	3.3%
Group III	..	46—65 years	2.72%
Group IV	..	All ages	3.0%

2. We therefore examined 60 healthy Indians, 30 vegetarians and 30 non-vegetarians with no discoverable renal or cardio-vascular disease. Twenty persons (10 vegetarians and 10 non-vegetarians) were in each age group, and we determined with Maclean's technique the urea concentration percentage with the following results:—

TABLE II.

Urea concentration test in healthy Indians.

		Ages.	Urea Concentration.
Group I	..	15—25 years	3.0%
Group II	..	26—45 years	3.27%
Group III	..	46—65 years	2.6%
Group IV	..	All ages	3.03%

These results demonstrate that there is no difference in the power of urea concentration,

either at all ages or in the different age groups, between the healthy kidney of the normal Indian and the normal Englishman in spite of the marked dietetic differences.

In both Indians and Englishmen the power of urea concentration lessens as age increases.

3. In Maclean's technique not more than 120 c.c. of urine must be voided during the second time of the test. The following shows that healthy Indians excreted less urine during this second hour than did Maclean's Englishmen.

TABLE III.

Maclean's urea concentration test.

Age group.	15-25 years.	26-45 years.	45-65 years.
Healthy Indians ..	51 c.c.	66 c.c.	45 c.c.
Healthy Englishmen	103 c.c.	96 c.c.	112 c.c.

4. Amongst our 38 Indian patients with parenchymatous nephritis, the urea concentration percentage worked out as follows:—

TABLE IV.

Urea concentration amongst Indians with parenchymatous nephritis.

Age group.	15-25 years.	26-45 years.	46-65 years.	All ages.
Indians ..	1.9%	1.2%	1.3%	1.5%
Englishmen (Maclean)	..	..	..	1.3%

5. As has been indicated, the concentration test for healthy Indians was estimated for 10 vegetarians and 10 non-vegetarians in each age group. The 38 cases of parenchymatous nephritis consisted of 22 vegetarians and 16 non-vegetarians. A comparison of urea concentration as between vegetarian and non-vegetarian, healthy and nephritic, is set out in the following table:—

TABLE V.

Urea concentration in vegetarian and non-vegetarian Indians.

Age group.	15-25 years.	26-45 years.	46-65 years.	All ages.
Healthy vegetarians ..	3.07	2.95	2.60	2.87
Healthy non-vegetarians	3.48	3.12	2.84	3.14
Nephritic vegetarians ..	2.05	1.22	1.50	1.59
Nephritic non-vegetarians	1.68	1.20	1.10	1.32

From this table, it would appear that healthy non-vegetarians concentrated urea better than healthy vegetarians, but once the non-vegetarian's kidney is inflamed it would appear to concentrate urea less well than the inflamed vegetarian's kidney. The deductions suggested by this table will, however, require fuller consideration.

CORRIGENDUM.

With reference to Capt. Karamchandani's article on p. 249 of our issue for May 1928, the following corrections should be made; p. 251, column 1, para 3 (small print), line 10, delete "although she had taken 510 grains (34 gms.) of quinine sulphate orally."

After "*P. vivax* infection," on p. 251, column 2, para 3 (starting with No. 426), line 6, add "although he had taken 510 grains (34 gms.) of quinine sulphate orally."

Indian Medical Gazette.

JULY.

THE BENGAL MEDICAL (AMENDMENT) BILL, 1928.

A VERY important Bill which is now under the consideration of the Bengal Legislative Council (in committee) is the Bengal Medical (Amendment) Bill, 1928. It is of importance, not only to Bengal, but also to the other provinces of India in which the introduction of similar legislation may be under consideration.

Under the Bengal Medical Act, No. VI of 1914, there was created the Bengal Council of Medical Registration, consisting of the following 15 members:

(a) A President and 7 members nominated by the Local Government.

(b) One representative of the Calcutta University.

(c) Six representatives of the different classes of medical practitioners.

The duties of the Bengal Council of Medical Registration, as defined in the Act of 1914 are similar to those of the General Medical Council of Great Britain, and were defined as follows:

(i) To maintain a register of medical practitioners holding recognised qualifications, who pay the registration fee, and to register their names.

(ii) To decide what titles or qualifications granted by universities or other examining bodies shall entitle a practitioner to registration.

(iii) To call on medical colleges and schools training students for registrable degrees, or desirous of recognition, to furnish such information as may be necessary to enable the Council to judge of the efficiency of the instruction given therein.

(iv) To depute its members to be present at examinations for registrable qualifications.

(v) To remove the names of registered practitioners from the register under the conditions laid down in Section 25.

In the introduction to the amending Bill, the Government of Bengal make the following statement:

"It is considered that the time has come to make the Council a more representative body by including members elected by the staffs of the Calcutta School of Tropical Medicine and of other recognised medical colleges and schools which are already in existence, or which may come into existence from time to time. It is also proposed to include a representative of the Railway Board which employs a large number of medical men. As it is not desirable to make the Council too unwieldy, it is proposed to cut down the Government nominees from 7 to 3, and to

reduce by one the number of representatives of the graduates and licentiates in medicine and surgery of the Calcutta University. The opportunity has been taken to give the Council specific power to inspect medical institutions, to extend and define the power of the Council to act through committees for inspection and other purposes, and to authorise the payment of fees for attendance at committee meetings and of travelling allowances for such attendance and for visits of inspection. Other amendments are consequential."

We give further details of the amending Bill in our Current Topics section in this issue, but it is obvious that the Bill has two main objects: (a) to make the Council much more democratic than it is at present, and (b) to make its powers of inspection of standards and examinations greater. Both objects will naturally appeal to the members of the medical profession in Bengal.

This being the position of affairs, a joint public meeting of the general medical practitioners in Bengal and of the Bengal Medical Association was held in February 1928, to consider the proposed amending Bill, and we have been asked to give publicity to the resolutions passed at that meeting. The report of this joint meeting is signed by Sir Nilratan Sircar as President of the Bengal Medical Association, and by Dr. Sundari Mohan Das as Principal of the National Medical Institute, and is published in our Current Topics section also.

The resolution begins with the usual abuse of Government, and a refusal to look the facts in the face. Fourteen years have passed since the Bengal Medical Act was passed, "and instead of a progressive measure we find a highly reactionary Bill for placing the whole of the independent profession, consisting of over 6,000 registered practitioners under the domination of a Government department." The resolution then goes on to demand the creation of a much more democratic Council than is suggested in the amending Bill, the abolition of the proposed representative of the Railway Board, and that the President shall not be nominated by Government, but elected from among the members of the Council.

Let us now try to face the facts under existing conditions in Bengal. The Bengal Council of Medical Registration is admittedly an *ad hoc* body created on lines similar to the General Medical Council of Great Britain. If we examine and contrast the duties and composition of these two bodies respectively, we may note the following points:

(i) Medical registration. This is mainly a matter of trained clerical staff under proper supervision and is not a matter of controversy.

(ii), (iii), (iv) Decision as to registrable qualifications; furnishing of information by medical colleges and schools; and inspection of institutions and examinations. In this connection we think that anyone who thinks the

situation over must admit that such matters can only be dealt with by those who have had personal experience of medical teaching and examination. It would be manifestly absurd to expect a body of representatives of the general medical practitioners of Bengal to decide whether standards of teaching and examination were adequate or not in the various branches of medical science. Even as it is, the Calcutta University has recently raised the standard for its M.B. degree very considerably in accordance with the wishes of the General Medical Council of Great Britain; and the new standard has been decided upon, not by a body of general practitioners, but by a Board of Medical Studies selected from among members of the Faculty of Medicine of the University. For those who desire to become registered practitioners in Bengal without undergoing the more rigorous test of a university M.B. examination, there is the License of the State Medical Faculty of Bengal. The expert in each branch of medical science can be trusted to see that the standard of teaching and examination in his own particular science is kept up to the mark; what is wanted is a leavening, but not a majority, of representatives of the general medical profession to see that the expert keeps within bounds, and does not ask for too much.

(v) This refers to the disciplinary side of the Council's activities, where a medical practitioner may be called upon to defend himself against a charge of professional misconduct brought against him. For this purpose a mixed tribunal containing perhaps a majority of general practitioners would be best, since the latter are often in a better position to appreciate the difficulties which practitioners are often faced with than are consultants, and teachers and examiners.

* * * *

The crux of the whole matter, however, is as to the composition of the Council. Certain modifications of the Bill have already been made in committee. Thus it has been decided to eliminate the proposed representative of the Railway Board, and in his place to increase the number of representatives elected by the medical graduates of the University of Calcutta from 2 to 3; also to delete the word "temporary" with regard to the recognition of medical schools.

The existing Bengal Council of Medical Registration consists of a President and 7 members nominated by the Local Government—all of whom are likely to be officials; a representative of the Calcutta University, who may or may not be an official; and 6 representatives of the different classes of medical practitioners in the province; a body containing 8 or possibly 9 official members in a total of 15 members. Let us compare with this the constitutions proposed (a) by the amending Bill; and (b) by the joint public meeting and the Bengal Medical Association. Under the present circumstances, these would be as follows:

Constitution as proposed by Government, and amended in committee.	Constitution as proposed by the resolution and the Bengal Medical Association.
(a) Nominated President, <i>viz.</i> , the Surgeon-General with the Government of Bengal (Official).	(a) President to be elected from among members.
(b) Nominated by Government; 3 members (Probably official).	(b) Nominated by Government....3. One of whom may be from the Calcutta School of Tropical Medicine (Probably official).
(c) Calcutta University. Representative....1.	(c) Calcutta University..1.
(d) Representatives of the Calcutta Medical College (probably an official), and of the Carmichael Medical College, Belgatchia. (Non-official)....2.	(d) Representatives of the Calcutta Medical College (probably official)....1 and of the Carmichael Medical College....1 (Non-official).
(e) One representative each of the Campbell, Dacca, Mymensingh, and Burdwan Medical Schools.... (Probably all officials). One representative each of the Calcutta Medical School, National Medical Institute, and Bankura Medical School....3 (Non-official).	(e) Two representatives between them (probably both official) of the Campbell, Dacca, Mymensingh, and Burdwan Medical Schools. Two representatives between them (non-official) of the Calcutta Medical School, National Medical Institute, and Bankura School.
(f) Representatives of registered University graduates....3.	(f) Representatives of registered University graduates....4.
(g) Representative of M.B. University graduates, registrable in Great Britain....1.	(g) Representatives of University graduates, registrable in Great Britain....2.
(h) Representatives of licentiates, not registrable in Great Britain....2.	(h) Representatives of licentiates....4.
(i) Representative of the Calcutta School of Tropical Medicine....1 (Probably official).	(i) <i>Vide</i> (b) above.

TOTAL.—21 members, of whom 10 are likely to be official, and 11 non-official.	TOTAL.—20 members, of whom 6 are likely to be official, and 14 non-official.
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A study of the above figures shows at once the wide gap which yawns between the proposals of Government, and those of the Bengal Medical Association. It also shows how untenable is the claim made by the latter body that the Government proposals would place "the whole of the independent medical profession in Bengal under the domination of a Government department."

Now it is not sufficiently recognised by the general public—or, indeed, sometimes by the medical profession itself—that the most important part of the duties of the General Medical Council of Great Britain are those concerned with the inspection of examinations, regulation of standards of medical education, and standardising curricula. The general public never hear of

these branches of its activities, so they are apt to think that the sole function of the Council is to deal with sensational cases of "conduct infamous in a professional sense," which result in much newspaper publicity. A similar ignorance with regard to the local Bengal Council of Medical Registration seems to be responsible for the present agitation to entirely democratise that body, regardless of the fact that its present composition is already more democratic than that of the General Medical Council of Great Britain.

The latter body consists of 42 members, of whom no less than 26 represent the universities and other examining bodies of England, Scotland, and North Ireland. These representatives are not elected by the graduates, but are selected by the governing bodies of these institutions, so that they represent the academic point of view. Of the remainder, 5 are nominated by the Crown—of whom 1 is a layman, and the other 4 are eminent senior members of the profession, 5 representatives of the dental profession, and *six* direct representatives, elected by the body of general medical practitioners complete the total. In Great Britain there are only 6 representatives of the total of over 30,000 general medical practitioners in a body of 42; in the Bengal Medical Council, as at present constituted, there are 6 representatives of 6,000 general practitioners in a Council of 15 members. The amending Bill leaves this number of 6 unaltered, but includes representatives of other institutions.

The Council of Medical Registration of Bengal is no more a Government department than is the General Medical Council of Great Britain, which exercises powers delegated to it by the Privy Council under the Medical Acts. In this country the system of administration is different, and the channel of devolution more complicated, but the result is the same; the powers of the Council are clearly defined in the Bengal Medical Act of 1914, and within the limits of that Act the Council is free to do as it pleases.

Most of the other objections raised have been met by the modifications which the amending Bill has undergone in committee.

With regard to the constitution suggested by the Bengal Medical Association, we would point out that in the Calcutta University official and non-official Fellows have equal rights, and that the Faculty could not be split up in the manner proposed for electoral purposes. To allot only 2 members to represent the Government medical schools and 2 to the non-official schools would be a most inequitable arrangement, since the licentiates passed out from the latter are—and for many years to come must necessarily be—only a small minority of the registered practitioners; whilst the number of representatives of general practitioners proposed—10 in all—would be too large in a body which has to discharge the important functions in relation to medical education outlined previously.

As the Calcutta School of Tropical Medicine trains candidates for the Diploma in Tropical

Medicine of the Faculty of Tropical Medicine of Bengal, and also candidates for the Diploma in Public Health of the Calcutta University, it is only fair that it should have one representative on the Council.

The position of the Surgeon-General of the Government of Bengal is peculiar. It is inevitable that he must be a member of the Council, seeing that the bulk of the students in medicine in Bengal are studying in Government medical colleges and schools, whilst as head of the medical department of Government he could hardly attend the meetings of the Council in any other capacity than that of President.

In conclusion, we may add that, in the opinion of many it is open to question whether, in view of the great importance of maintaining a high standard of medical education, and the difficult questions likely to arise as new medical schools come up for recognition, Government has not already gone too far in surrendering its power of nominating members. Elected members are notoriously liable to be chosen for their political views, rather than for their knowledge of the subjects to be dealt with, and politics should have no concern with medical education. The doctor should never forget that he is a citizen, but on a political platform he is out of place.

A Mirror of Hospital Practice.

AN UNUSUAL CASE OF "STRANGULATED HERNIA."

By C. H. REINHOLD,

LIEUTENANT-COLONEL, I.M.S.,

Civil Surgeon, Delhi.

KALEY, a Hindu male, aged 25 years, came to the Ludovic Porter Hospital, Meerut, on 13th April 1928.

He had a swelling on the left side of the scrotum the size of a Bombay mango; hard and tender to the touch but resonant on percussion, marked restlessness and an anxious facies. The temperature was 99° and the pulse 105.

The duration of the condition was 4 days.

The patient stated that he had noticed this swelling coming down into the scrotum, especially on standing, for about three years, but a little pressure was applied sometimes with a little pressure was applied sometimes with difficulty. From the condition of the patient a diagnosis of strangulated hernia was made, and he was at once prepared for operation. On making the usual incision it was found that there was no constriction of the neck of the sac or strangulation of the gut which was of normal appearance; but the sac was full of bloody fluid; the internal ring was large and patulous, but the mesentery of the loop of bowel in the sac was a solid hæmatoma. The only difficulty experienced in reducing the intestine into the abdomen was caused by this condition of the mesentery, but it was successfully manœuvred

through the internal ring without having cause to enlarge it; after reduction the internal ring admitted one finger comfortably. The operation for radical cure was completed and the patient returned to bed. He made an uninterrupted recovery; his wound healed by first intention, and the patient was discharged cured on the 28th April 1928.

The special features of this case are:—

- (1) that there was no strangulation of the bowel, as appeared certain before operation, and
- (2) the unusual amount of blood-stained fluid in the sac, considering the condition of the bowel.

The questions arise:—

(a) Was the hæmatoma of the mesentery due to thrombosis by trauma, the result of forcible taxis? This was denied by the patient, and his friends; though undoubtedly some efforts must have been made to reduce the hernia.

(b) Was this a case of embolism of the mesenteric artery with infarction? Or

(c) Was it a case of thrombosis of the mesenteric vein in a herniated loop of bowel unassociated with trauma?

Against (a), one would expect at least some bruising of the loop of bowel if sufficient taxis had been used to produce the extensive hæmatoma found. There was no such bruising. Against (b); an embolism would produce more effect on the loop of bowel concerned than was seen. The loop looked perfectly healthy and of a good colour; there was no suggestion of congestion, duskiness or gangrene.

Regarding (c) thrombosis due to stasis in a dependent loop of gut in an old-standing hernia of three years' duration seems to be the most likely diagnosis; but this is admittedly uncommon, and the patient was a healthy young man and not debilitated, as one would expect in considering predisposing causes.

Clinically the case as first seen was a typical strangulated hernia, though perhaps the symptoms were not as severe as one would expect after four days obstruction, and I think no surgeon would have held his hand and refused relief by the knife.

But, in the light of what was found at operation, might not a natural cure have taken place?

The thrombosis was obviously not progressive, and he never looked back after the operation.

I have never seen a case of this nature before, and would be interested to hear the experience of other surgeons.

My thanks are due to Dr. Wahid-ud-din Haider, now Civil Surgeon of Meerut, for his skilful assistance and subsequent care of the patient.

A CASE OF HYSTERICAL BLINDNESS.

By S. P. SHROFF, F.R.C.S.,

Banarsi Mansions, Chandni Chowk, Delhi.

ON 6th April 1928, when I was working in my consulting room, I got a telephone message

to the effect that a young man soon after coming from the church suddenly got blind, and requesting that I should see him immediately. I asked his relatives to bring him to the office, and within half an hour he was there. Notes on the case are appended:—

L., a Roman Catholic, aged 26 years, healthy in appearance, by occupation a clerk.

Family History.—Father alive, aged 51 years. Mother died of heart failure when the patient was 2 years old. No brothers. One half-sister, 14 years old and healthy.

Habits.—Fairly active, smokes 25 cigarettes a day, a teetotaler, eats meat in fair quantities and is fond of reading particularly at night.

Physical Examination.—The patient when he entered into my room was brought by the aid of two friends and was completely blind. He had not even perception of light as he failed to appreciate a strong electric light which was in front of him.

Cornea.—Clear.

Anterior Chambers.—Normal.

Pupils.—Regular and active.

Tension.—Normal.

Fundus.—As far as could be seen with the undilated pupil, was normal.

I put in 0.5 per cent. of atropine before making another examination and engaged him in conversation and found tremors of the lips and fingers. From his replies to questions he seemed a man of emotional nature. I made another dark-room examination and again failed to find anything abnormal there. I made up my mind as to the diagnosis (i.e., hysterical blindness). In order to be sure, I asked him to call again next morning and prescribed in the meantime a blue pill to be taken at night and followed up by magnesium sulphate in the morning. He went back with his relatives to the chemists to get the medicine. On the way the young man had a violent sneeze and immediately recovered his sight. Next morning he entered my room unaided which confirmed my diagnosis of hysterical blindness. To make matters doubly sure, I sent him to a well-known physician to overhaul him. The physician did not find anything organically wrong with him, except that he had a few bad teeth which required looking after. All his organs were sound and healthy; his reflexes were exaggerated. I think, it would be well if I quote the physician's own words. "He (the patient) has told me all his history and I conclude that it is a case of hysteria." The treatment needs no special comment.

ELECTRO-COAGULATION (DIATHERMY.)

By P. P. LALVANI, L.C.P.S. (Bom.),

X-Ray Department, Civil Hospital, Karachi.

G. P., a cultivator, aged 45, residing in Gorabari in Karachi district, suffered from rodent ulcer.

PLATE II.



History.—The condition started as a small pimple on the inner canthus of the left eye, which gradually increased to the size of a large pea. After about two weeks it burst and discharged pus. The ulcer was dressed by a local doctor but continued to grow towards the nose

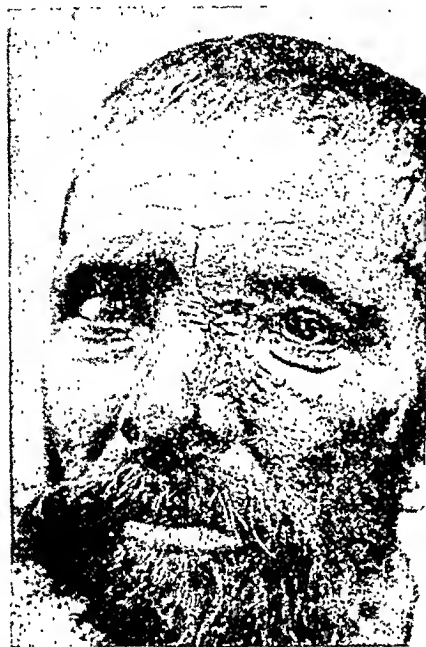


FIG. 1.—Before treatment.

and also downwards towards the cheek. It was very painful and in about two months the pain was so severe that he was unable to sleep at night. The left eye became swollen and could be opened only with great difficulty. The first photograph was taken when I first saw the

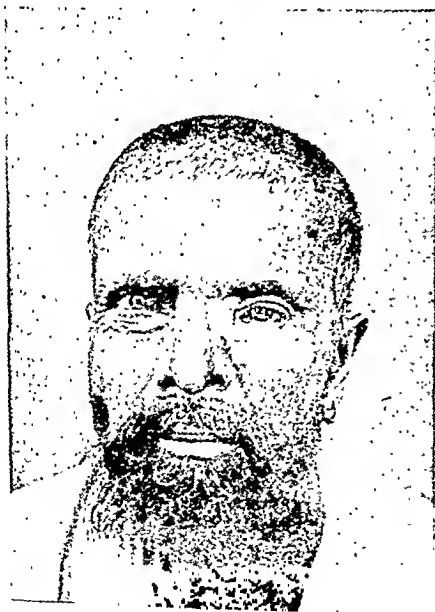


FIG. 2.—After treatment.

patient, i.e., six months after the appearance of the growth. It shows a hard nodular ulcerated growth involving the left inner canthus and the left side of the nose as far as the *alæ nasi*. There

were also a few nodules over the lower eyelid. There was considerable swelling of the tissues surrounding the growth. The case was seen by Lieut.-Col. I. Davenport Jones, I.M.S., Civil Surgeon, Karachi, who was of the opinion that it was a rodent ulcer.

Treatment.—The growth, along with a little healthy tissue round about and also the nodules on the lower eyelid, were electro-coagulated with the diathermic knife at one sitting on March 28th. This was done under novocaine infiltration anæsthesia. That evening there was considerable swelling of the left side of the face. This swelling subsided in about four days and the slough over the electro-coagulated area separated in two weeks time. The pain disappeared entirely after the electro-coagulation. It took about three weeks for the ulcer to heal up completely. The second photograph was taken five weeks after treatment. It shows a soft scar over the area. There is no ectropion of the lower eyelid and the patient can open the eye fully.

Diathermic electro-coagulation is preferable in such cases where the growth is situated in the vicinity of the eye, as the resulting scar after surgical operation will pull the eyelid and cause ectropion. With diathermy the scar is very supple and does not pull the eyelid.

I am greatly indebted to Lieut.-Col. I. Davenport Jones, I.M.S., Civil Surgeon, for his kind encouragement, valuable advice, and permission to publish notes on this case.

A RARE CASE OF DERMAL LEISHMANOID.*

By UPENDRA NATH BRAHMACHARI,
M.A., M.D., PH.D., RAI BAHADUR,
and

SIRIS CHANDRA BANERJEE,
Sub-Assistant Surgeon.

AFTER attention was drawn by one of us (U. N. B.) to skin eruptions due to infection with *Leishmania donovani*, Acton in collaboration with Napier has described the following stages of this disease:—

- (1) An early de-pigmented stage.
- (2) A later nodular stage.
- (3) A xanthoma-type of the disease in which there is a tendency towards fibrous tissue formation, and constriction of venules and subsequent dilatation.

It is stated by these authors that the nodules appear in the place of de-pigmented patches.

Generally speaking, cases of dermal leishmanoid come for treatment when both the nodules and de-pigmented patches are present in the skin. The present case is therefore of much interest, as it showed an erythematous patch over the face and a few nodules over it with complete absence of de-pigmentation in any part of the body, confirming the view of

*Read at a meeting of the medical section of the Asiatic Society Bengal in April 16th, 1928.

one of us that the disease may first show itself in the form of patches of erythema over the skin before the appearance of de-pigmentation or nodules.

History.—About three years ago the patient had an attack of kala-azar, was treated with about thirty injections of sodium antimony tartrate, and was apparently cured. About a year ago he noticed a small patch over the bridge of the nose which gradually extended and assumed the present size. A few papules appeared subsequently over the erythematous area.

Present Condition.—Patient is a healthy individual. There is no enlargement of spleen or liver. There is no fever. Blood culture is negative. There is no anaesthesia over the erythematous patch nor over any other part of the body, nor is there any thickening of the nerves. A careful examination of the scrapings from the face showed the presence of a few Leishman-Donovan bodies after a prolonged examination. No lepra bacilli were found from these scrapings.

The case is of interest as such cases very rarely come under observation. Generally speaking, cases that present themselves for treatment show definite de-pigmented areas, with or without nodules either inside them or in independent foci in the skin.

A word about the nomenclature of the disease. Various names have been suggested, one of the latest being post-kala-azar dermal leishmaniasis (Acton and Napier, 1927). But of all the names suggested the name dermal leishmanoid appears to be the most convenient, on account of its simplicity, and especially in view of the fact that the disease is now frequently recognised under this name and it may appear without any previous treatment with antimony for visceral leishmaniasis.

Note.—Some years ago Dr. Brahmachari exhibited a patient, who had previously suffered from kala-azar, suffering from a nodular condition of the skin; he was able to show that these lesions contained leishmania and suggested the name "dermal leishmanoid" for them.

The name was not altogether satisfactory. The suffix "oid" denotes "resemblance to the thing indicated by the preceding element of the compound," to quote from a well-known medical dictionary. Syphiloid suggests a lesion resembling syphilis, but not necessarily caused by the *Treponema pallidum*. Now the most striking thing about these lesions was their lack of resemblance to any previously described leishmania lesion, [except possibly the lesions described by Thomson and Balfour (1909) for which they suggested the name Leishman nodule]. On the other hand, working on the same analogy leishmanide would have been a more suggestive name. It has subsequently been recognised (Acton and Napier, 1927) that this nodular form is only one stage in the series of pathological changes caused by this parasite in the skin.

The whole series of changes are due to a widespread infection of the skin by leishmania; the lesions are confined to the skin proper, the epithelium never being invaded at any stage. The name "dermal leishmaniasis" is, therefore, descriptive. There are, however, two other forms of leishmaniasis which affect the skin; in both of these the epithelium also is nearly always affected, so that the name cutaneous leishmaniasis is perhaps more suitable for them. Nevertheless, one of

these, oriental sore, is very frequently referred to as dermal leishmaniasis; so, to avoid all risk of confusion it was necessary to qualify further the condition under discussion. It is quite true that all patients suffering from this condition do not give a history of having been treated for kala-azar. About half the patients in Acton and Napier's series gave this history. There is, however, no difference between the lesions of the patients who do, and of those who do not, give this history, so that it is almost certain that the aetiology of the condition in each group is the same; that is to say, they have all at one time suffered from a generalised leishmania infection. It is purely an academic question whether or not one is justified in referring to the transitory generalised leishmania infections as kala-azar. Post-kala-azar dermal leishmaniasis is a clumsy name, but it defines the condition; the alternative, post-generalised dermal leishmaniasis is certainly worse.

Dr. Brahmachari's claim on the score of priority is sound, but only as far as the nodular phase, the phase which he described, is concerned.

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(EDITOR, I. M. G.).

FLOATING SPLEEN: SPLENECTOMY: RECOVERY.

By J. B. VAIDYA,

MAJOR, I.M.S.,

Civil Surgeon, Guntur.

E., a female aged 40 years, was admitted on 5th March 1928 for a tumour in the abdomen and distension due to fluid. She was having attacks of pain in the abdomen for the last two years and had noticed a small movable tumour in the abdomen. She delivered 10 months back and had had no trouble during labour. The child is living. A month before admission, she was getting fever with rigors for 15 days. At this time she noticed that the tumour was increasing in size and the abdomen was getting distended. She had also a dragging sensation in the abdomen. She was branded in a few places on the abdomen.

On admission the patient had a big distended abdomen with fluid in it, and oedema of the feet. The measurement was 40 inches. A hard tumour could be felt lying in the lower part of the abdomen below the umbilicus. The long axis was placed transversely and it extended towards the right of the middle line. The tumour could be moved upwards and laterally to some extent.

Owing to the branding marks on the skin, operation was postponed for some time till the skin got healthy. The patient was put on mistura alba, and iron and strychnine. On 22nd March 1928, the size of the abdomen was reduced, the measurement being 29½ inches; on 28th March 1928 there was a further reduction in the size to 28½ inches round the umbilicus. The tumour could now be felt much better.

A ridge and a notch could be felt, and suspicions of its being the spleen were strengthened.

The abdomen was opened on 3rd April 1928. There was no fluid in the peritoneal cavity at all. The tumour was found lying below the umbilicus with its long axis placed transversely. It was found to be the spleen which had got displaced. The splenic region was empty. There were a good many weak adhesions to the intestines which were separated gently. The great omentum was adherent to the convex surface of the spleen, which was facing downwards and forwards. These adhesions were removed under ligature. Three silk ligatures were used in different places to the pedicle. The pancreas was not attached to the hilum and did not come in the way while dealing with the hilum and the pedicle. The spleen weighed $1\frac{3}{4}$ pounds. The abdomen was closed by through and through sutures.

The patient had a rise of temperature up to 102°F . for two days after the operation, after which it gradually came down to normal in 10 days. The wound healed by first intention and there was no distension of the abdomen or any other untoward signs after the operation. The blood count on 13th April 1928 was as under:—

Red blood cells	..	3,087,500	per c. mm.
White blood cells	..	8,125	" "
Hæmoglobin	..	50	per cent.
Colour index	..	0.8	" "
Polymorphonuclears	..	81	" "
Lymphocytes	..	12	" "
Large mononuclears	..	4	" "
Eosinophiles	..	3	" "

One of the interesting features of the case was the complete disappearance of the fluid in the abdomen with rest and mistura alba.

FATAL EXFOLIATIVE DERMATITIS AS A COMPLICATION OF SANOCRY SIN TREATMENT OF PULMONARY TUBERCULOSIS.

By J. M. TALATI, M.B., B.S., D.O.,
S. R. M. Tuberculosis Dispensary, Karachi.

D. W., a well-built but poorly nourished male Mohammedan (Khoja) about 48 years old, was admitted with a history that he had come to Karachi only 2 days back from Gwadar where he suffered from a more or less dry cough for about 6 months, hæmoptysis in very slight quantity twice (the last attack being about one month back), and fever off and on, but continuous for the last few days with slight chills without perspiration. His brother and his first wife died of tuberculosis and some of his children died from "weakness." On admission (16th May 1927) his temperature was 99.6° , weight 8 st., and there were signs of consolidated patches in both lungs, particularly the right upper and the left lower lobes. His sputum though "negative" on admission, was soon found to be "positive." After about 3

months routine treatment, although his chest showed signs of some improvement (fewer adventitious sounds being heard), his weight had slowly decreased by 6 lbs., his sputum was still full of tubercle bacilli, the general improvement was not considered satisfactory, and it was decided to put him on sanocrysin treatment.

Sanocrysin was then administered intravenously (dissolved in fresh, sterile distilled water)* in doses and on dates as mentioned below:—

1st Injection.—19th August 1927, dose 0.1 grm.

2nd Injection.—24th August 1927, dose 0.1 grm., i.e., after 5 days' interval.

3rd Injection.—2nd September 1927, dose 0.25 grm., i.e., after 9 days' interval.

4th Injection.—12th September 1927, dose 0.25 grm., i.e., after 10 days' interval.

5th Injection.—21st September 1927, dose 0.5 grm., i.e., after 9 days' interval.

6th Injection.—3rd October 1927, dose 0.5 grm., i.e., after 12 days' interval.

During the course of injections the usual necessary precautions were taken as far as possible; the urine was constantly examined before and after the injections and never showed any trace of albumen. The febrile reactions after the injections were very slight and transient. There were no focal reactions, and fairly long intervals were given between the injections (about 5 to 7 days' interval is considered quite sufficient and safe for the doses employed). In one and a half months he gained nearly 3 lbs. in weight (often patients lose weight under Sanocrysin treatment); his general health improved; and his chest signs cleared up except for a few fine dry rales.

He presented himself again on the 12th October 1927, i.e., after 9 days' interval, for another injection. While preparing his arm for the injection, it was noticed that in the bends of his elbow, localised to the flexor surfaces only, he had a slight eruption, just like ordinary heat-rash, which he said was only a day or two old and there was no noticeable itchiness about it. His urine showed no trace of albumen, there were no gastric or intestinal symptoms, neither any affection of the mucous membranes of the mouth and gums, and no fever. He was, therefore, given a dose of 0.6 grm. Sanocrysin which caused him a sharp febrile reaction; and by the 14th October he had developed a well marked extensive and very itchy eruption, papulo-macular and covering almost every part of the body. There was now no doubt that the eruption was due to metallic poisoning from gold (in sanocrysin) and immediate steps were taken to counteract the same. On the 14th and 15th he was given sodium thiosulphate in 1-gramme doses intravenously, ichthyol in pill form internally, and an oily preparation with sulphur and acid salicylici for external application. By the 16th, however, his whole body

* I am still using the sterile distilled water, but I have lately been advised to try normal saline solution instead.

was so covered with eruptions, which had turned vesiculo-pustular, and his skin so puffed and cedematous that no veins could be got at. At the advice of my colleague in charge of the venereal clinic, who also unfortunately happened to have had the sad experience of having one of his patients develop exfoliative dermatitis after neosalvarsan treatment, it was decided to try contramine. He was given 0.25 grms. contramine intramuscularly on 20th, 21st, 22nd, 24th, and 28th October. The mucous membranes of the eyes, nose, mouth and intestine were all affected, there was mucopurulent conjunctivitis, gingivitis and severe stomatitis, and diarrhoea set in about the 23rd. Although the eruptions showed signs of retrogression and drying up under the treatment, the uncontrollable itching continued and almost maddened the patient at times. The exhaustion caused thereby, aided by the severe diarrhoea, finally carried off the patient on 6th November. His urine till very near his end (i.e., up to 1st November, after which he was under treatment of another medical man) never showed any signs of albumen.

There are various points of interest in this case:—

(1) A severe exfoliative dermatitis following sanocrysin treatment appears to be very rare. Professor Arthur Ellis(1) reports a case from the London Hospital. Professor S. Lyle Cummins(1) and (2) (South Wales Sanatorium, Talgarth) reports that "One of Dr. Watson's cases developed exfoliative dermatitis, presumably from metallic poisoning, after 6.25 grms." Dr. G. Marshall (Guy's Hospital), though not definitely mentioning exfoliative dermatitis, says "severe reactions with exanthem and albuminuria have been observed, although small doses were employed."

(2) A fatal end caused by exfoliative dermatitis appears to be rarer still. I have come across only two instances in the literature available here; the first case I cannot lay my hand to, but the second case was reported by Morland and Zimmerli (3) as "one case in which the skin reaction was so severe as to shorten the life of the patient."

(3) The dermatitis appeared after a total of only 1.7 grms. of sanocrysin. The patient received 2.3 grms. inclusive of the last dose, which was given after the dermatitis had just started, as will be seen from the history of the case.

(4) The doses given were very moderate, compared to those given by the originator or to those even now used in Europe. It has, however, been found advisable to reduce the doses still further and I am using it now in something like the following doses: 0.1 gm., 0.1, 0.2, 0.25, 0.35, 0.5, 0.6, 0.75, 0.85 and 0.9 grams. (Sanocrysin is available in India in 0.1, 0.25, 0.5 gm. doses; the above course can, therefore, very easily be given without wasting any drug

by opening the necessary number of the ampoules of required dosage).

(5) The intervals between the doses were longer than usual and each dose was repeated.

(6) There were no other poisoning symptoms or danger signals. In spite of constant watch no trace of albumen was found during the whole course.

(7) The rash appeared at the bend of the elbows, itchiness was not noticeable, and as it simulated ordinary prickly heat, its significance was at first missed. It, therefore, appears that any kind of skin rash appearing during the course of sanocrysin treatment should be carefully watched and further injections suspended till either the rash disappears or proves to be something innocuous.

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- (1) The Gold Treatment of Tuberculosis: Second Report by Medical Research Council. *Lancet*, 1926, p. 181.
- (2) Some Suggestions as to the Method of Use of Sanocrysin in Pulmonary Tuberculosis. By Col. S. L. Cummins, C.B., C.M.G., M.D., etc. *Tubercle*, 1926, Vol. I, p. 486.
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THREE INTERESTING PHOTOGRAPHS.

By J. B. VAIDYA,

MAJOR, I.M.S.,
Civil Surgeon, Guntur.

1. A boy aged nine years; 25 inches in height; the lower extremities are very small and



the fingers of the hands are very rudimentary. He holds articles in the clefts of his fingers by extending and bringing them together. Intelligence is good.

2. Child aged about one year. Born with the tumour. The tumour is longer than the head. There is a very big gap in the cranium



2.



3.

through which the contents of the tumour extend.

3. Conjoined twins. Died three days after birth. This photograph was obtained through the courtesy of Mr. Sharfuddin, photographer, Guntur.

AFEBRILE *B. TYPHOSUS* ENTERO-COLITIS.

By B. P. TRIBEDI, M.B.

From the Department of Pathology, Medical College and Hospitals, Calcutta.

PATIENT N.—aged 24 years, a fifth year student of the Calcutta Medical College, brought a sample of his own faeces on 3rd September 1927 for examination for *Entamoeba histolytica*.

History of the case.—The patient had been getting slight griping pain and passing diarrhoeal motions with mucus almost every day for the last two years. He had had two courses of emetine and salines, and stovarsol treatment but with no effect.

His stool was examined macroscopically and seen to be semi-solid with a large amount of mucus; microscopically—no amoebæ or cysts were found; there were a few red cells and a large number of pus cells. The specimen was plated and a heavy growth of *B. typhosus* was obtained. A second sample of stool was examined and that was practically a mass of mucus with very little faecal matter at all. A pure growth of *B. typhosus* was isolated from the washed mucus.

A catheter specimen of urine was cultured and found to be sterile.

Blood agglutination reaction by Dreyer's method with organisms of the enteric group was done with the following result:—

B. typhosus—Positive up to 1 in 833.

Para A and B—Negative in all dilutions from 1 in 25 upwards.

Blood Count:—

Total leucocytes—5,300 per c.mm.

Total erythrocytes—4,230,000 per c.mm.

Differential Count:—

Polymorphs	..	68 per cent.
Lymphocytes	..	28 "
Large monos	..	1 "
Eosinophiles	..	3 "

The patient had had no rise of temperature throughout and he had been carrying on his usual activities. He had no history of any fever except in his infancy, the exact nature of which could not be determined.

It was apparent that the case was one of *B. typhosus* infection and the symptoms were attributed to it. An autogenous *B. typhosus* vaccine was made and the initial dose—5 millions—was given to the patient.

After the first dose, the symptoms, viz., griping and loose mucoid motions, greatly diminished. After the next dose—10 millions, the symptoms practically disappeared. He was

given a full course of vaccine treatment, and was completely restored to health.

On two occasions subsequently his fæces were examined culturally and no growth of *B. typhosus* was obtained.

Comment.—It is interesting that such a condition of the bowel caused by *B. typhosus* should have continued for such a long period without giving rise to any other manifestations; the vaccine treatment seemed to act specifically.

DELAYED PUTREFACTION AFTER BURIAL: A CASE OF MEDICO-LEGAL INTEREST.

By INDULAL S. DAVE, M.B., B.S.,

Medical Officer, Civil Hospital, Kadi (N. Gujrat), Baroda State.

I HAD occasion to perform a post-mortem examination on a dead body twenty-five days after its burial. The circumstances in which it was buried and the appearances on exhumation are so important that they may be found of interest to the medical profession.

On a cold winter night in January a man was murdered by throttling and then buried at a distance of about two miles away in a field. After burial the ditch was made up as before, so no doubt arose and the site was kept moist constantly by the flowing of water daily for agricultural purposes. Water was also percolating and the period between burial and exhumation, three weeks, happened to be the coldest part of the year. Twice during the season frost had damaged the crops in this country. So, naturally, the flowing water, the percolating water and eventually the dead body had a very low temperature.

The appearance on exhumation was such that the whole body was intact, features fully recognizable, and it looked as fresh as if buried quite recently. Though decomposition had started, it had only reached such a degree as to suggest that the man had died 48 or 72 hours before. In the post-mortem notes the description is as under:—

Rigor mortis absent; post-mortem lividity on hinder parts; cuticle peeling off; abdomen swollen; skin separated from flesh at many places.

No external injuries except a depression on either side of neck in front; pnum adami had been fractured and the depressions on either side of it were found to have ecchymosis underlying, as shown on dissection.

Brain—liquefied.

Heart, lungs, liver, spleen and kidneys decomposed.

The stomach contained 2-3 ozs. of partially digested *khichadi*.

Signs of asphyxia were also marked. The right side of the heart was full of dark blood; lungs partially collapsed; colour of heart, lungs, mucous membranes of stomach and intestines, liver and spleen was darkish.

So there was no difficulty in forming the opinion as to the cause and mode of death. But the time of death could not be ascertained from the post-mortem examination only, as the process of decomposition was retarded a great deal.

The points of interest are:—

The dead body remained as in a refrigerator due to the cold of the season and absence of air. The water was flowing about 2 feet above the body and the soil was wet at exhumation even some depth below the dead body.

Though one would expect adipocere to have formed in a warm country like India, there was none in the present case as the weather was not warm. Lyon's *Jurisprudence* says "the process occurs more slowly in damp soil than in water."

As to retardation of putrefaction, the following facts may be observed:—

(1) Bodies putrefy more rapidly in summer than in winter.

(2) Bodies putrefy more rapidly in air than in water, and less rapidly in earth.

(3) Protection from air retards onset and progress of decomposition.

(4) Decomposition in running water is slower than in standing water.

Under the circumstances mentioned, the comparatively fresh appearance of the dead body was not incompatible with death having taken place 25 days previously.

SOME OBSERVATIONS ON THE ANTI-MALARIAL PROPERTIES OF PLASMOCHIN.

By AKHIL RANJAN MAJUMDAR, M.D., B.M.S.,
Physician, Campbell Medical School and Hospital, Calcutta.

SEVERAL papers have been published testifying to the value of plasmochin as an antimalarial drug of high potency. The advantages claimed for it are:—

(i) A very small dose, 1—1½ grains daily, is sufficient to control fever.

(ii) Unlike quinine, it produces no nervous symptoms during its administration.

(iii) It quickly removes the crescents from the peripheral blood.

Quinine is long in the field and it has an established reputation as a practically infallible drug in the active stage of malarial infection; it is not easy to find a drug to rise superior to it or even approach it sufficiently near, but plasmochin promises well.

Dr. O. Urchs, M.D., of the Havero Trading Co. very kindly put a liberal supply of plasmoquinine compound at my disposal and I at once set about to make some observations on it.

This sample was in tablets, each containing.

Plasmochin, gr. 1|6.

Quinine Sulphate, gr. 2.

These tablets, therefore, contained a little quinine also and I was told that this combination considerably added to the potency of plasmochin, specially for malignant tertian infections.

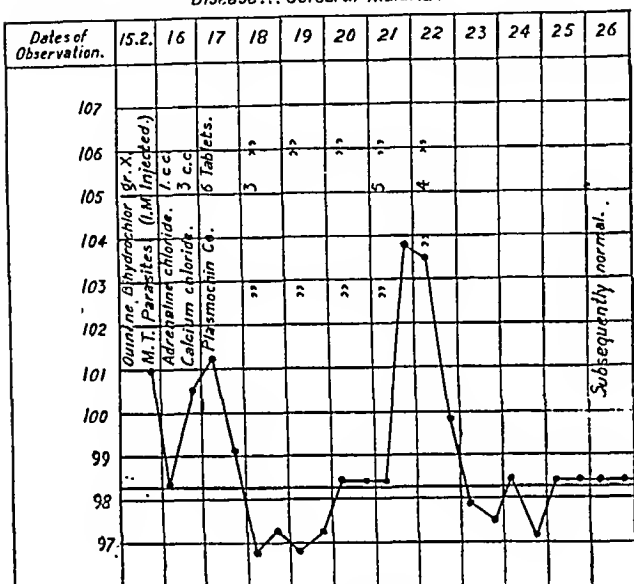
The daily dose of plasmochin is about 1—1½ grains and so for that purpose 6 tablets must be given in 24 hours. But this with my sample would contain 12 grains of quinine as well.

Twelve grains of quinine itself can control the fever of benign tertian infection. So I decided to try this compound in a dose, the quinine content of which was not likely to control fever, though this would at the same time reduce the dose of plasmochin below the prescribed therapeutic limit.

A well nourished young Mahommedan male was admitted with sharp fever. He was somewhat dazed. The spleen was slightly enlarged.

CAMPBELL MEDICAL.

Name...Ali Mahammed. Caste...Mohamedan, Male Age...25.
Disease...Cerebral malaria.



Case No. 1.

The blood film showed a fairly heavy infection with malignant tertian rings. He was at once given quinine bihydrochlor. gr. x, intramuscularly. Next day he was given plasmochin compound 6 tablets and the day after the temperature came to normal. The dose was at once reduced and he was put on three tablets a day; this means quinine sulphate, 6 grains, and plasmochin, ½ grain, a day. The temperature remained normal for 3 days and on the 4th day it shot up again. He was given 5 tablets and the next day 4 and no more. The temperature came to normal and remained so for another 6 days—during the time no parasites and no crescents were found in the peripheral blood. After this he left the hospital.

Case No. 2.—A rather cachectic Hindu boy was admitted with markedly enlarged liver and spleen. From the general clinical picture, blood count and globulin precipitation test, kala-azar was diagnosed and he was given an injection of urea-stibamine 0.05 gm., but the temperature shot up higher still. The blood was again examined and benign tertian parasites were found. He was given plasmochin compound 6 tablets for 2 days and 4 tablets for one day and no more. The temperature came down to normal

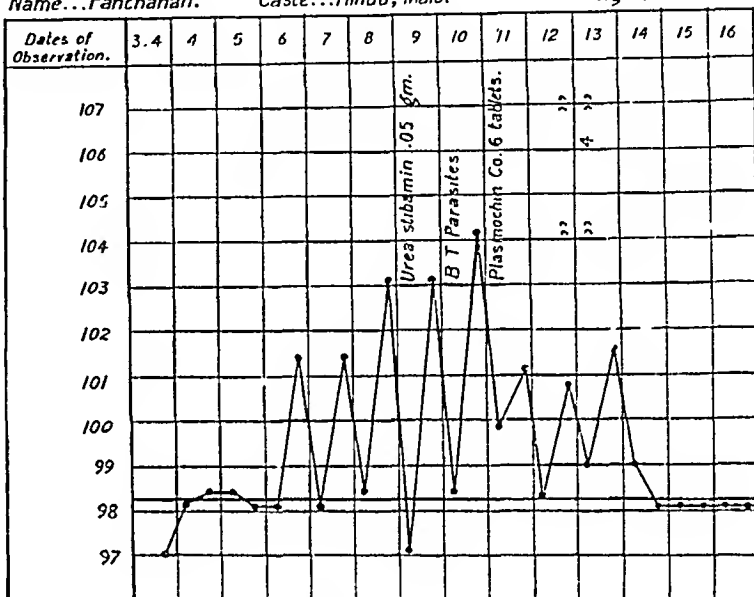
and remained so for the next 4 days and no parasites were found in the blood. The anti-kala-azar treatment was then resumed.

Case No. 3.—A well-built Hindu male was admitted for the treatment of intermittent fever. His spleen was slightly enlarged. Blood slides were taken at the height of fever and benign tertian parasites were found. He was given plasmochin compound tablets 6 one day and 4 on the next and no more. The temperature came down to normal and remained so for the next four days while he was in the hospital.

Case No. 4.—A Nepalee woman was admitted with high fever. The spleen was slightly

CAMPBELL HOSPITAL.

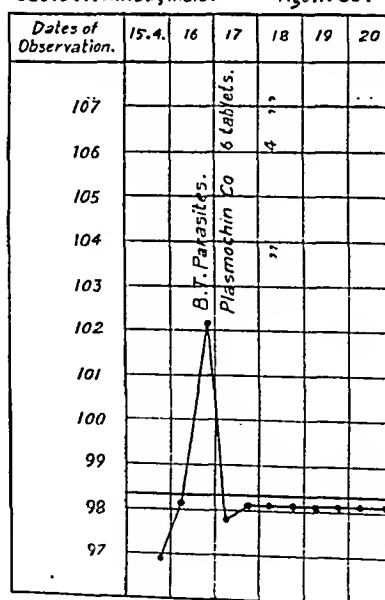
Name...Panchanan. Caste...Hindu, Male. Age...15.



Case No. 2.

Name...Rupnarayana.
Caste...Hindu, Male.

Age...35.



Case No. 3.

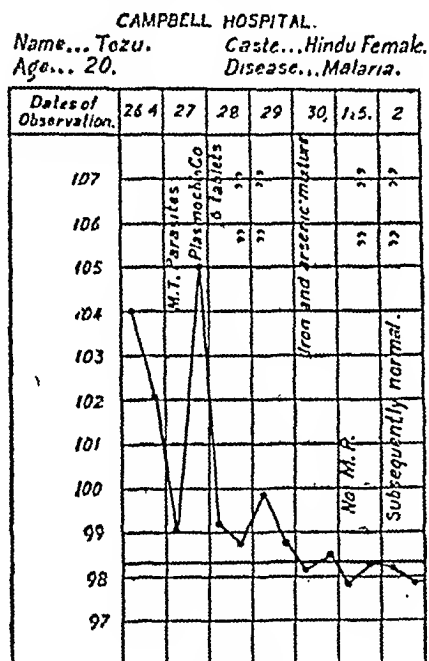
enlarged and the liver was just palpable at the costal margin. She was complaining of terrible headache and was frequently vomiting a bile-coloured fluid.

She was put on an alkaline mixture and hydrarg. subchloride in fractional doses. The blood was examined and malignant tertian rings were found. She was at once put on plasmochin compound 6 tablets a day. These were continued for three days and the effect is best shown in the temperature chart.

These tablets did not aggravate the vomiting, as sometimes happens with quinine tablets, and there was no other discomfort except a certain amount of cinchonism.

She was apparently healthy before the attack, but this short fever of 4 or 5 days duration made her very anæmic, the hæmoglobin value falling as low as 35 per cent. She was, therefore, put on a mixture of iron and arsenic.

The blood was again examined on the 6th day after admission and on the day of discharge but no malarial parasites were found. The spleen was no longer palpable.



Remarks.

Though the number of cases were very few, it was amply proved that plasmochin was a powerful antimalarial drug. The temperature was brought down quickly with a very minimal quantity. None of these cases had any disagreeable symptoms, probably because a very small dose was given to all of them.

THE USE OF INTRAVENOUS QUININE AND ARSENIC IN ALGID CASES OF MALARIA.

By S. J. BELLGARD, L.T.M., D.T.M. (Bengal),

Medical Officer, E. B. Railway, Bochaganj.

DINAJPUR district is reckoned as one of the hyperendemic areas of North Bengal, and needless to say has a high malaria death rate.

In the bad season, i.e., from July to October, malaria is at its height and its incidence is aug-

mented by the influx of non-immune labour for railway construction work.

The following are the common algid forms encountered; (a) cerebral, 60 per cent. (b) abdominal, 30 per cent. (c) pulmonary, 10 per cent. I had one case of a cutaneous petechial eruption in a young Punjabi, whose blood on microscopic examination showed numerous malignant tertian rings, the petechiae disappearing after one "A. A. Q." injection intravenously (arsenic, adrenalin and quinine).

A few notes on the species of *Anopheles* found, with their seasonal changes.

The paddy fields afford a good bed for mosquito breeding during the monsoon months. *A. culicifacies* was the common species found in July and August; and towards the close of the monsoon *A. sinensis* and *barbrostris*. *A. umbrosus* and *funestus* were also found in dirty stagnant water surrounded by wild vegetation.

The table below shows that the following three species were numerous during a smart epidemic in September last year.

(a) *A. barbrostris*, (b) *A. sinensis*, and (c) *A. culicifacies*.

Species found.	Number found.	Dissection showed.
<i>A. funestus</i>	.. +++	Sporozoites.
<i>A. barbrostris</i>	.. +++	Zygotes.
<i>A. sinensis</i>	.. +++	"
<i>A. culicifacies</i>	.. +++	Sporozoites.
<i>A. umbrosus</i>	.. +	Nil.
<i>A. philippinensis</i>	.. +	Zygotes.
<i>A. gigas</i>	.. +	Nil.
<i>A. vagus</i>	.. +	Nil.

There was a smart epidemic of malaria among the railway staff in early September, 1927, which was not unusual, owing to an influx of a large number of apparently non-immune labourers having joined the construction from Bihar and the United Provinces.

The men came early in August, and in September the epidemic began. I was at first at a loss as to the best procedure to be adopted to tackle it, especially as a good many cases were of algid type in which quinine by the mouth was useless. Finding no other alternative I initially began treatment of all algid cases with the usual quinine and adrenalin treatment by the intravenous route, which in some cases necessitated the use of 2 or 3 injections at intervals of 4 hours before they recovered completely from the algid state.

Arsenic being a useful adjunct to quinine in malaria and beneficially used in malarial cachexia for its hæmoglobin producing effect by its action on the bone marrow, etc., I ultimately decided to try the effect of arsenic and quinine together by the same route intravenously in malaria. This undoubtedly gave me far more satisfactory results than quinine alone for the following two reasons.

- (1) Its action was quicker and more lasting.
- (2) Relapses were fewer.

The attached table gives the total number of cases treated over a period of two months (September and October) with quinine alone, and with quinine and arsenic together.

Technique of Preparing the Injection.—In a sterile glass tube dissolve the quinine bihydrochloride in 20 c.c. of normal saline, then add liquor arsenicalis hydrochlorici and heat over a spirit lamp. Aspirate the contents of the tube into a 20 c.c. sterile hypodermic syringe, add 10 minims of liquor adrenalin hydrochlor 1:1000 (P. D. & Co.) and inject, preferably at the bend of the elbow.

Dosage.

Age	Quinine	Liq. Arsenic Hydrochlor.
6—10	3—4 grs.	m i.
11—15	5 grs.	m ii.
16—20	7 grs.	m iii.
21 and over.	10 grs.	m iv.

required 3 or 4 injections daily, followed by a tonic of arsenic, iron and strychnine for 3 weeks.

I might mention finally that there was no mortality from malaria among the railway staff, in spite of the numerous algid cases encountered.

The majority of the patients responded quickly to one injection, the temperature coming to normal within 3 or 4 hours after the injection.

This injection has proved valuable on railway construction work, where one has to deal with large members of ignorant labourers who utterly refuse to take any form of quinine by the mouth, as a good many of them have a belief that the administration of quinine causes insanity.

The labour strength is also kept up to a working percentage which is a great help to the engineer in charge in the progress of the work, and financial saving in the budget.

Total number of algid cases Treated.	BLOOD EXAMINATION.				Total number treated with quinine alone.	Average number of injections given per man.	Relapses.	Percentage of relapses.	Total number treated with arsenic, quinine.	Average number of injections per man.	Relapses.	Percentage.
	M. T.	B. T.	Q.	Mixed.								
During the year 1927.												
791	490	70	20	211	483	2	217	45%	308	1.23	68	22%
(including private cases).						4 hourly				6 hourly		

Non-pregnant women and debilitated men were given 7-grain doses.

Once the patient recovered from the algid state he was put on to a mixture consisting of arsenic, quinine and strychnine t.d.s. for three weeks continuously.

Precautions.

1. The solution and syringe must be sterile.
2. The solution at the time of injection should be of the same temperature as the patient.
3. The injection should be made as slowly as possible; 1 minute for every c.c., to prevent acute dilatation of the heart.
4. The proper technique in administering intravenous injections must be observed.

Its Use in Relapsing Cases.

The results of using this method in chronic relapsing cases have been very encouraging.

Dr. C. J. Newman, District Medical Officer, E. B. Railway, Saidpur, obtained good results in his cases, although one bad European case necessitated the use of two injections.

In my series of relapsing cases, I found that malignant tertian cases responded very well, but the mixed malignant and benign tertian cases

Current Topics.

Calcutta Branch of the B.M.A.

A branch of the British Medical Association has been formed in Calcutta to include that portion of Bengal which lies to the south and west of the river Ganges. Will members of the British Medical Association residing in that area (who are *ipso facto* members of the Branch) kindly forward their names and permanent addresses to the Honorary Secretary (Dr. John M. Henderson, The School of Tropical Medicine and Hygiene, Calcutta). This procedure is necessary in order to bring the list of Branch members up to date.

Members of the medical profession living in the above area and desirous of joining the Association may obtain application forms from the Honorary Secretary.

The Bengal Medical (Amendment) Bill, 1928.

We publish below an abstract from the *Calcutta Gazette* of the chief items of this Bill, which, in the main, represents an attempt to make the constitution of the Bengal Council of Medical Registration a more democratic one than it is at present.

Whereas it is expedient to amend the Bengal Medical Act, 1914, in the manner hereinafter appearing;

It is hereby enacted as follows:—

This Act may be called the Bengal Medical (Amendment) Act, 1928.

For section 4 of the Bengal Medical Act, 1914 (hereinafter referred to as the said Act), the following shall be substituted, namely:—

Constitution of Council.

"The said Council shall consist of the following members, namely:—

(a) A president to be nominated by the Local Government;

(b) Three members to be nominated by the Local Government;

(c) One member to be elected from among the members of the Faculty of Medicine by the Senate of the Calcutta University;

(d) One member to be elected by and from among the staff of each Medical College or School permanently affiliated to the Calcutta University or to any other University hereafter established within Bengal;

(e) One member to be elected by and from among the staff of each institution in Bengal other than those mentioned in clause (d) which is or may hereafter be recognised permanently by the Bengal Council of Medical Registration for admission of its students to the Licentiate standard of examination of the State Medical Faculty of Bengal;

(f) Two members to be elected by registered practitioners who are graduates or licentiates in Medicine or Surgery of the University of Calcutta;

(g) One member to be elected by registered practitioners who are qualified to be registered under the Medical Acts;

(h) Two members to be elected by registered practitioners other than those referred to in clauses (f) and (g);

(i) One member to be elected by and from among the staff of the Calcutta School of Tropical Medicine; and

(j) One member to be elected by the Railway Board; Provided that, of the members to be elected under clause (f) or clause (h), one member shall in each case be elected by registered practitioners practising outside Calcutta."

Section 19 of the said Act shall be re-numbered as sub-section (1) of section 19, and the following shall be added to the said section as sub-section (2), namely:—

"The Council shall have power to inspect any such Medical College or School and may for this purpose appoint a Special Committee of not less than three or more than five members of the Council to inspect any such institution and submit a report in regard thereto, to the Council to enable them to judge of the efficiency of the institution."

The Central Medical Association and the Bengal Medical Amendment Bill, 1928.

We are asked to give publicity to the following resolutions passed at a joint meeting of medical practitioners and the Bengal Medical Association in February 1928, with regard to the Bengal Medical (Amendment) Bill, introduced in the Bengal Legislative Council in January 1928. The report is signed by Sir Nilratan Sircar, Kt., M.A., M.D., D.C.L., LL.D., President of the Bengal Medical Association, and Dr. Sundari Mohan Das, Principal of the National Medical Institute, Calcutta.

"The avowed object of the bill is to make the Council a more representative body than it is at present. But unfortunately the provisions proposed in it would not only frustrate the object, but would materially divest it of whatever little popular character it has at present.

While introducing the first bill in 1914 the Hon'ble Member-in-charge admitted that a certain degree of control would be placed in the hands of the Government, as that was the "first step" towards self-government in the medical profession and medical education and which

could be transferred to the representatives of the profession within a reasonable time. Fourteen years have passed since then, and instead of a progressive measure we find a highly reactionary bill for placing the whole of the independent profession consisting of over 6,000 registered practitioners under the domination of a Government department. We do not see how the representative character of the Council can be enhanced by severally franchising every one of the half a dozen or more Government medical schools to fill up the seats in the Council, when as a matter of fact every one of these representatives would be officers in the Government Medical Department under the Surgeon-General. A mere copy of the constitution of the British Medical Council which also extends the franchise to all the teaching corporations and licensing bodies independent of government control, has been attempted by proposing similar franchise to government medical schools which at present means four existing and four prospective government schools, all of which are managed and controlled by the Surgeon-General. The existing three non-official schools, being temporarily recognised, have been unjustly excluded from the franchise list.

Then again it is highly absurd to count a nominee of the three European members of the Railway Board as a "representative member" on the Medical Council. Is it held that this board of three individuals, with its all-India jurisdiction should be privileged to "elect" a similar representative on each of the six other provincial medical councils in India? If the privilege is to be given to the Railway Board on the ground of their being employers of a large number of medical men, the claims of mofussil municipalities, district boards and the Calcutta Corporation for similar franchise is even much greater.

The Calcutta School of Tropical Medicine is concerned chiefly with post-graduate teaching and research, and is not primarily concerned with the training of candidates for any registrable qualifications. We are therefore of opinion that instead of granting a franchise to this school it would be fair for the Government to nominate one of the members of their staff to one of the three seats that may be reserved for Government.

We have no objection to larger powers being granted to the Medical Council provided there be a definite non-official majority in the board, but we are afraid that similar powers in the hands of the proposed Council would be highly undesirable.

With regard to Section 2 we beg to suggest the following in place of the proposed constitution of the Council.

(a) One member to be elected from among the non-official members of the Faculty of Medicine by the Senate of the Calcutta University.

(b) One member to be elected by each and from amongst the staff of each medical college or school affiliated to the Calcutta University hereinafter established within Bengal.

(c) Two members to be elected by and from amongst the staff of the medical schools in Bengal established by Government and recognised by the Council of Medical Registration.

(d) Two members to be elected by and from amongst the staff of the non-official medical institutions recognised by the Council of Medical Registration.

(e) Four non-official members to be elected by registered practitioners who are graduates or licentiates in medicine and surgery of the University of Calcutta.

(f) Two non-official members to be elected by registered practitioners who are qualified to be registered under the Medical Acts.

(g) Four non-official members to be elected by registered practitioners other than those referred to in clauses (e) and (f).

(h) Three members to be nominated by Government.

The President to be elected by the Council as is the practice in the Bengal Legislative Council, municipalities and district boards, and the University of Dacca. No Government medical practitioners in service should be allowed to stand for election from

classes (a), (c), (f), and (g), as is the practice in the elections to Provincial Legislative Councils, the Legislative Assembly and Calcutta Corporation.

With regard to Section 10—the term of membership of elected and nominated members should terminate automatically at the expiry of the Council term.

With regard to Section 33—we beg to observe that *mofussil* voters should form a separate electorate from the Calcutta voters, and separate electoral rolls for both should be kept.

The Perforation of Gastric and Duodenal Ulcer.

By SIR BERKELEY MOYNIHAN, *Bart.*, K.C.M.G.,
C.B., M.S., F.R.C.S.

(*The Practitioner*, March 1928, p. 137.)

THIS is such a very important clinical paper, based upon such very extensive personal experience, and constituting such an important contribution to abdominal surgery, that we have taken the following very considerable extracts from it.

Acute perforation may occur either in acute or in chronic ulcers. It affects chronic ulcers far more frequently than acute ulcers. The condition is therefore one of acute perforation in a chronic ulcer. It is necessary to be precise upon this point, for the literature of this subject contains many inaccurate assertions that perforation occurs in acute, rather than in chronic ulcers. In twelve consecutive years at the Leeds Infirmary (1910–1921) there were 61 deaths from perforation of a gastric ulcer; in 60 cases the ulcer was of the chronic variety. There were 117 deaths from perforation of a duodenal ulcer. In 12 of these cases there was an acute ulcer; in 4 of the 12 there was a chronic ulcer also, and it was in every case the chronic ulcer which had perforated. In 8 cases an acute ulcer had perforated. In my own list I find that the great majority of the cases of chronic ulcer which perforated had undergone medical treatment for longer or shorter periods on one or more occasions. The same experience had occurred to Sherren, who records: "218 cases of perforated duodenal ulcer treated at the London Hospital; in 6 only was there no previous history of indigestion." Similar figures were obtained in 248 cases of perforated gastric ulcer. In hæmorrhage due to a chronic ulcer the same applies. As the majority of these patients had had more than one course of medical treatment—several had been having intermittent treatment for ten years and one for thirty-two—we are perfectly justified in considering them failures of that treatment; and, if surgery was unable to be employed successfully in these emergencies, the mortality is medical rather than surgical. Walton found that of 79 cases of gastric or duodenal ulcer which were fatal, 78 were seen on post-mortem examination to have ulcers of the chronic variety.

It is certain, therefore, that the perforation, whose symptoms and treatment we are to discuss, is concerned, as a rule, with chronic rather than with acute ulcers.

Signs and Symptoms.—The acute perforation of an ulcer is a terrible catastrophe. The patient is plunged at once into a condition of prostration and of unendurable agony unsurpassed, with one exception, in human experience. The pain is almost beyond description. It seizes the patient in a moment, and deals him a blow that he himself may think is mortal. It attacks the whole of the abdomen, and is especially severe in the upper part; it is described as "tearing," "racking," "bursting," "horrible," "everywhere;" it spreads over the lower part of the chest and even up to the shoulders.

Appearance of Patient.—Within a moment or two the patient's appearance betrays his suffering. The face is pale, haggard, anxious and appealing; the eyes are wide and watchful; the brow and temples are bathed in sweat, the hair soaked. Horrible suffering quickly delves deep lines upon his cheeks. The patient struggles for breath in short, panting respirations which are chiefly costal, the diaphragm making not the slightest movement. The nostrils are wide, the mouth shut, and every expiratory

effort is audible. He complains of cold, and feels cold when a hand is laid on him. The thermometer registers 96° or even a little lower. No movement is made that can be avoided, and words are spoken only in the shortest expiratory jerks, every syllable being part of a deep groan. If a hand is stretched out to touch his body, the patient shrinks from an added terror and will protect himself as best he can with his arms. His legs are soon drawn up. He reaches the very limit of human power to withstand suffering, and his appearance arouses the very gravest anxiety as to his state and may even suggest that death is hastening to him.

Shock.—The condition, indeed, is one for which no other word than "shock" seems fitting. Yet "shock" in the surgical sense is absent. Shock used in its strict sense means the condition in which an increased pulse-rate, a diminished blood-pressure and a reduced blood volume are present. Not one of these is found in the first hour or two after a perforation has occurred. The rate of the pulse is found to be normal, its quality, as a rule, good; the blood-pressure is within normal limits. The blood volume has been measured in only a few of our cases, but that, too, shows no change. It is, therefore, inadmissible to use the word "shock" without qualification to describe the state of a patient who is in the toils of this terrible calamity. There is, of course, the most terrible prostration. Perhaps, apart from severe hæmorrhages, no disease except acute pancreatitis (in which true shock is present) produces so profound a degree of prostration. We must, therefore, not less in the interest of accuracy than in that of the welfare of the patient, cease to use the word "shock" in this connection. Let us speak of prostration, a word which has only a clinical significance. Shock, it is true, comes later in these cases; it comes when peritonitis has developed. But peritonitis is not perforation; it is a late and preventable sequel to perforation. It is the perforation we seek to recognise; the peritonitis we seek to forestall.

Examination of Abdomen.—The examination of the abdomen in this stage reveals a characteristic condition. The muscles are in sterner rigidity. The hand travelling gently over the abdomen finds no soft or yielding area. Every part offers the most inflexible opposition to pressure; the rigidity is obdurate, persistent and unyielding. There is no movement. The diaphragm, largest and strongest of abdominal muscles, is as rigid as the rest, and the shallow, frequent respiration finds in this its explanation. All parts, too, are tender, though the upper abdomen is, as a rule, definitely more sensitive than the lower. One side of the abdomen may be a little more resistant and a little more tender than the other. And this may help to decide whether it is a gastric or a duodenal ulcer which has given way. Only the most gentle examination is permissible; it is unnecessary and indeed inhuman to do more; for the diagnosis of a surgical emergency requiring immediate relief is beyond doubt, and the sooner a dose of morphine is given and preparation made for operation, the better.

Prostration.—The period of initial prostration varies in different cases, and its length depends no doubt upon many factors: the size of the perforation, the condition of repletion of the stomach, the general powers of resistance of the patient, etc. As a rule it lasts not less than an hour and rarely more than two hours. It is followed by a period of reaction. Little by little the pain subsides; though still remaining very severe, the sharp edge of it is blunted. The cold greyneess or pallor of the face is followed by a slight flushing, an indication that the general circulation is becoming more vigorous. The pulse-rate rises, the limbs grow warm, the temperature reaches or slightly exceeds the normal. Relief from an agony that has almost passed belief may persuade the patient that all is well. The victim lifted from the rack fell asleep, though his residue of pain would have seemed acutest suffering but for its comparison with the far greater agony from which he had just escaped.

Pain and Vomiting.—Pain in this period is still present and severe enough. The abdomen is steadily increasing

in size, and its walls have still the same incoercible rigidity as before. Respirations remain hurried and shallow, for the diaphragm is now pressed upwards by the fluid and gas which are beginning to accumulate within the peritoneal cavity. Fluid has gravitated to the pelvis, and the peritoneum there, acutely inflamed, may be recognised as exceedingly tender if a rectal examination is made. It is in this stage, as a rule, that vomiting first appears. This symptom is by no means frequent, and is very rarely severe.

Liver Resonance.—The abolition of liver dullness is often asserted to be a sign of great value in the diagnosis of a perforated ulcer. It appears at a time when the diagnosis should be made without any difficulty; it is a late and not an early sign. The value of percussion is therefore to be regarded as important if it shows an absence of liver dullness, especially if an hour or two before the dullness has been recognised; but unimportant if the liver dullness is found to be normal. In other words, the loss of liver dullness as a positive sign in the absence of meteorism is significant, even decisive; the presence of liver dullness neither helps nor denies a diagnosis.

Progress of Patient.—As time passes, the state of the patient grows progressively and rapidly worse. Vomiting may be repeated, and liceous, sometimes exceedingly distressing, may develop. The abdomen grows larger and larger, fluid may be present, and a shifting dullness may indicate its quantity. The face grows hollow and the expression strained and weary. The features appear sharp, the skin is livid and sweating, and is often cold and clammy. The pulse deteriorates in value and increases greatly in frequency. The whole condition and appearance of the patient indicate the extreme gravity of the case, and a fatal ending may be expected within three or four days unless operative measures can bring relief.

Diagnosis of Acute Perforation.—After perforation has occurred, there should be no difficulty in making a diagnosis of sufficient accuracy to dictate a policy of action. It is important only to know that something has happened within the abdomen which cannot be relieved by any other than surgical measures. It is not of real importance to know whether it is a duodenal or a gastric ulcer that has ruptured; or whether the pancreas has suffered an acute hæmorrhagic inflammation; or whether the appendix is sphacelated. All these things can be recognised at once when the curtain of the abdominal wall is lifted. The one essential thing is for the medical attendant to recognise that something is threatening life, and that the sooner the threat is removed the better.

All the symptoms and signs related above should be remembered; but for a policy of action it is enough to know that when an acute intolerable attack of agony comes suddenly, and the abdominal wall is at once on guard, intensely resistant and unyielding and everywhere tender, the cause may be this or that, but the remedy lies in operation and in operation alone.

Viscero-sensory Reflex.—When a gross destructive lesion affects any viscus, the sympathetic nerve or nerves communicate their misfortune to the spinal associates who at once raise the alarm. The reflex experienced may be sensory or motor. The viscero-sensory reflex is expressed in hyperalgesia, the viscero-motor in muscular spasm, that is, rigidity in the implicated area. As soon as the parietal peritoneum is involved, however, the effects produced are no longer reflex, but are direct, since this membrane is possessed of its own spinal nerve supply.

The detection of cutaneous hyperalgesia, the viscero-sensory reflex, in any area requires a certain skill. It may be gauged by stroking the skin with a pin held at an angle with the surface; a vigorous scratch must be avoided, for that would discover sensitiveness in all. A short, gentle stroke is first made on the normal skin of the chest or thigh, and then on the abdominal wall. A better method is to pinch a little fold of skin lightly between the thumb and forefinger and draw this away from the underlying muscles. If a disturbed reflex is

present it causes the patient to wince; a quick involuntary movement is made, or a hand lifted to protect the tender part. This method has the advantage that, pressure over the parietal peritoneum being avoided, hyperalgesia can be differentiated from tenderness.

Abdominal Rigidity.—The abdominal rigidity present in cases in which an ulcer has perforated is extreme. No handling, however gentle, however prolonged, discovers one instant of yielding. The muscles remain immobile and unrelaxed throughout; and the diaphragm, strongest of all abdominal muscles, is equally inflexible. The whole contents of the abdomen are surrounded by fixed, firm, unyielding walls, which make no concession to the gentlest hand. The spasm provides the perfect muscular splint for the affected viscera. When this degree of rigidity is present, it infallibly indicates the presence of a lesion requiring surgical assistance for its relief. To this truth there is in my experience no exception. Universal unyielding abdominal rigidity indicates an intraperitoneal catastrophe. In the first few hours no measures other than those of general anaesthesia, and even those with difficulty, can abolish this rigidity. A large dose of morphine may lessen it; it seems powerless to dissipate it completely. This is fortunate; for other symptoms and signs, especially after the administration of an anodyne, and even without this, are apt to fade away, or perhaps to disappear in the stage of reaction. Rigidity remains. It is as true an indication of the presence of a crisis as all other signs and symptoms combined. No practised hand finds any difficulty in distinguishing this form of rigidity from the stiffness of an abdominal wall voluntarily brought about by the patient during an examination which is expected to cause discomfort. If in such cases the hand is kept at rest on the abdomen for a few moments, especially when the patient's mind is distracted by questions, a yielding now and again, especially at the end of expiration, is soon discovered. No voluntary rigidity is ever so incompressible as that excited by a viscero-motor reflex. When the patient is asked to breathe deeply, the free movement of the diaphragm will show that no rigidity affects it. And the diaphragm is as much an abdominal muscle as any. If others are rigid because of a viscero-motor reflex the diaphragm, too, will be motionless.

Differential Diagnosis.—It is necessary to state the problems confronting the diagnostician in the simplest terms. They are these: a patient who lies prostrate and motionless, who has suddenly been seized by an attack of unsupportable agony within the abdomen, whose abdominal muscles are all inflexibly rigid without sign of movement and obdurately resistant to pressure, has suffered a disaster which needs the immediate aid of a surgeon. His condition does not enable us to localize the lesion, but merely to assert its existence.

The examination of a patient so grievously afflicted must be brief; motives of humanity no less than of urgent necessity compel us to hasten in decision and to be quick in action. Recent experience appears to show that the most positive evidence of perforation is derived from an examination by means of x-rays. While the patient's breath is momentarily held, a photograph is taken. The presence of a bubble of gas, free in the peritoneum, above the liver, is conclusive and the earliest evidence of perforation.

The patient may give a history of former attacks of indigestion, which may lead one to suspect, and even to be confident in diagnosing, an ulcer of the stomach or duodenum. The universal rigidity may appear even more perceptible at the upper part of the abdomen; and one side may seem to be more tender or more resistant than the other.

The fact that fluids escaping from the torn duodenum, or from the pyloric region of the stomach, encounter the little hillock in the transverse mesocolon and are deflected to the right, escaping down the outer side of the ascending colon to the right iliac fossa, where some accumulation may occur, accounts for the fact that the localizing signs of appendicitis may sometimes be quickly developed.

Acute Pancreatitis.—This is often said to present great—indeed, insuperable—difficulties in diagnosis. But if this case is carefully studied and examined there need be no hesitation in reaching a definite discrimination between the two conditions. Deaver has said that the chief reason for failure to make a diagnosis of acute pancreatitis is that one does not "think of this disease" at the moment. It is certainly an infrequent condition; the perforation of a duodenal ulcer is common enough; and therefore, probability being the very guide of life, the perforation of an ulcer is at once in the forefront of one's mind. There is much truth in this; for when the diagnosis of acute pancreatitis is made in a case discussed with others, it is often received with immediate assent. There should, however, be not the least difficulty in making an accurate diagnosis in the earliest stages.

Acute Thoracic Diseases.—These may cause the greatest difficulty in diagnosis; no surgeon of large experience is unfamiliar with that close mimicry of an acute abdominal catastrophe which is presented by such diseases as acute diaphragmatic pleurisy, acute pneumonia, and acute pericarditis, especially when they occur in young people. These diseases are often ushered in by acute pain which develops quickly, if not suddenly; and the pain, because of the involvement of the lower dorsal nerves which end in the abdominal wall, chiefly affects the parts involved when an ulcer has leaked. In such cases, too, there is often exquisite surface tenderness and restriction of movement of the abdominal muscles, or even at the first immobility, and a considerable degree of rigidity. All these may appear at a time when the pulmonary or cardiac condition is very slight, or even absent so far as gross physical signs are concerned. It is only by earnest consideration of certain points that a discrimination may be possible:—

(a) The examination of the abdomen by the practised hand will disclose the fact that, though tenderness and rigidity are both present, they are not by any means so striking as in cases of perforation. Surface tenderness may be exquisite and a gentle pinching of the skin almost intolerable; yet deep, firm, but still gentle pressure will be a comfort to the patient. Neither rigidity nor tenderness is universal; a little relaxation of the abdominal wall may be found in the hypogastrium or in the iliac regions, especially at the end of each expiration, and here, too, cutaneous sensitiveness is less acute. Rectal examination discloses no tenderness of the pelvic peritoneum. Indeed, as a rule, a continued observation will be convincing as to the greater implication of the upper as compared with the lower parts of the abdomen.

(b) The temperature is nearly always raised, perhaps by 2, 3, or 4 degrees in thoracic conditions; it is depressed when an abdominal disaster has recently occurred. In some pulmonary diseases the initial or an early symptom may be rigor, and within a short time the sensitive swollen edge of the lip may indicate that herpes is developing.

(c) The respiratory frequency is accelerated out of all proportion to the pulse-rate. There may be 40 respirations or even more to the minute, while the pulse-rate remains near or even below 90. The ratio of pulse to respiration is normally about 40 to 10. If it is 30 or 25 to 10 then the cause usually lies above the diaphragm, and not in the abdomen. This change in the ratio is the most significant of all signs, and in all cases the closest regard must be paid to it.

Acute Appendicitis.—The differential diagnosis between acute appendicitis and the perforation of an ulcer may sometimes present difficulty. This is more especially the case towards the end of the period of reaction.

Both the clinical history and the physical signs, however, should enable an accurate differential diagnosis to be made. In acute appendicitis the onset of pain is never so severe, never overwhelms a patient with its unendurable intensity; it is never quite so sudden, but reaches its greatest height an hour or two, or even more, after the first pangs are noticed. The perforation of an appendix certainly causes a sudden and an exceedingly severe pain, even an agony; but perforation is the consequence of some added factor in an already inflamed

appendix which has declared its infection by signs and symptoms which should easily be recognised. The rule, with few exceptions, if any, is that the perforation of an appendix follows the administration of aperients given because of the abdominal discomfort caused by the inflammation of the appendix. Without aperients there is never perforation.

Abdominal Colic.—An attack of abdominal colic—biliary, renal or intestinal—is often believed to present difficulties of differential diagnosis. There should be none. An attack of colic comes with equal suddenness, but it excites not immobility but agitation and infinite restlessness. A patient struck down by the perforation of an ulcer is motionless; his body is intensely rigid, every active movement is avoided, and every passive movement bitterly resented. Even every act of inspiration is shortened, so as to avoid any slightest abdominal movement. A patient in the agony of colic can find no resting-place. He writhes and groans, and moves about or rolls on the bed or floor in search of the comfortable position he never finds. His arms are pressed to his abdomen, and he welcomes the strong pressure of another hand. There is never any universal abdominal rigidity. There is local stiffness, and the abdominal muscles are tightened in the effort of groaning, but there is not the slightest evidence of general involuntary rigidity. The pictures of the two sufferers are so completely different that it is impossible to suppose that the difficulties in diagnosis can exist for those who have seen the states produced by these two catastrophes.

Profuse Haemorrhage.—There are occasions when profuse hæmorrhage associated with severe pain may produce a condition requiring to be distinguished from that of perforation. Of these the most common and the most serious is concerned with the rupture of a tubal gestation. There is the same sudden onset of acute abdominal pain, the same immediate prostration, the same acute anxiety for the patient's life. Beyond these there is little resemblance. Blood which escapes, sometimes in very large quantities, into the abdominal cavity is little irritating, one is tempted to say in no degree irritating, to the peritoneum. Its entry is not resented and accordingly does not cause the same extreme response, either visceromotor or viscerosensory, as is made by irritating gastric or intestinal contents. There is therefore not the same agonizing pain, nor is there the same incoercible abdominal rigidity. This catastrophe occurs, as a rule, after the menstrual period has been missed. A sudden severe pain, not of the same prostrating severity as in rupture of an ulcer, but, nevertheless, very acute, is noticed almost at the same moment that a vaginal loss of blood occurs.

Intestinal Obstruction.—Various forms of intestinal obstruction sometimes cause symptoms not widely diverging from those of perforation. There is the same sudden onset of pain, and the same implication of the whole abdomen in the response; there are vomiting, prostration, slowly advancing distension; there is absolute cessation of voluntary intestinal discharge, of flatus as of feces. But there is not the same fierce intensity of the symptoms in any form of intestinal obstruction except one, volvulus. And in this, as in all others, the abdominal rigidity does not approach the metal-like fixity and immobility seen in cases of perforation; nor is the pain so agonizing. There is in obstruction an immediate onset of vomiting and this symptom persists and is uncontrollable. Small quantities are ejected frequently, indicating that the stomach is already over-distended, and is continually being filled, no matter how quickly it endeavours to empty itself. The ejected matters are gastric, then duodenal or jejunal, brown, offensive, and bitter. "Fæcal" vomiting is seen only in cases of gastro-colic fistula, or a few moments before the agony of death. The term "fæcal vomiting," indeed, should disappear from the vocabulary of intestinal obstruction.

Mesenteric Embolism or Thrombosis.—A condition, happily infrequent, which may give for perhaps a few hours at the onset as close a resemblance as any other to acute perforation of the stomach is mesenteric

embolism or thrombosis. There is the same sudden onset of acute intolerable pain; the same prostration, some degree of abdominal rigidity, and a quickly-developing distension of the whole abdomen. But the pain soon becomes intermittent, and is spoken of as "cramp"; blood appears in the stools, sometimes within an hour or two. The patient becomes profoundly collapsed, the pulse-rate rises rapidly, the temperature falls. There is often, though not invariably, an obvious source from which an embolus might be derived, vegetative lesions on the left side of the heart being the commonest.

Takes Dorsalis Crises.—There is only one matter remaining for discussion. It concerns the mimicry of these cases of abdominal catastrophe by the "crises" dependent upon takes dorsalis. No case of abdominal disease, acute or chronic, is adequately examined unless the pupillary reactions and the ankle and knee-jerks are observed. Gastric crises may cause symptoms which are mistakenly attributed to organic diseases of the abdominal viscera.

Conclusion.—The conclusion from this discussion is clear. The diagnosis of an abdominal calamity requiring immediate surgical treatment is made when a sudden attack of prostrating and overwhelming agony is associated with an obdurate, unyielding rigidity of an abdominal wall which is everywhere excessively tender and immobile. Shock in the strict surgical meaning is not present. If we wait for it, we are risking the patient's life; for it is not an evidence of perforation, but of the peritonitis which is preventable, and should be prevented. We may not be able to say, when these signs alone are present, that the catastrophe is certainly in one viscus, or certainly in another. It matters little where it is, all we need to know is that wherever it is, and whatever it is, it is irremediable except by surgery. We must reduce this matter to simple terms and that is the only method by which we can succeed. The salvation of a human life is a greater thing than the establishment of a convincing irrefutable clinical diagnosis.

Operative Treatment.—The technical details in connection with the various operations will be found in other works concerned with the craft of surgery. I propose here to discuss only their applications and results. When a perforation has occurred there are obviously two methods of dealing with the gap in the stomach or duodenum. The opening may be closed; or it may be used for the insertion of a tube. The results of surgery, given adequate competence in the operator, depend almost entirely upon the time that has elapsed after perforation.

If the operation be performed early and the conditions are favourable the rent in the viscus is closed. If this closure brings about an immediate stenosis, or appears to threaten or ensure stenosis in the future, the question of the performance of a short-circuiting operation will arise. Alternatively, the rent in the viscus may be enlarged, the ulcer excised, and the incision so sutured as at once to enlarge the calibre of the viscus at the part implicated.

If the operation be performed late—if it is a rescue operation rather than a reparative operation—then the opening in the base of the ulcer may be used for the introduction of a tube, rapidly fixed in position, and employed for days after as a means of introducing fluid food to sustain an almost exhausted or nearly moribund patient. A drain into an overloaded peritoneal cavity is rapidly introduced above the pubes, but time will not allow of more than this.

There is an increasing tendency on the part of most surgeons, I think, to deal, if possible, reparatively with a lesion in the duodenum. The whole ulcer together with the gap in or near its centre is excised, and the resulting opening, perhaps of large size, is so sutured that not only is a stenosis avoided, but a larger calibre of the intestine results.

These conclusions, may be drawn:—

(1) In gastric ulcers affecting the stomach, in parts other than the pyloric antrum, the closure of the perfora-

tion is all that is required. If the patient is in a later stage of the catastrophe, or if the gap is inordinately large, the opening in the stomach may be used for the introduction of a tube; that is the performance of a temporary gastrostomy.

(2) In duodenal ulcers, where the rent is small and surrounding induration absent or of very limited extent, closure of the perforation is all that is required.

(3) In duodenal ulcer where the rent is larger and induration more extensive, one of two courses may be followed:—

(a) The ulcer may be infolded and gastro-enterostomy or gastro-duodenostomy performed.

(b) The rent may be enlarged, the ulcer excised, and a plastic operation which secures an enlargement of the passage from the stomach may be performed.

(4) In duodenal ulcer, where the gap is very large and induration excessive, one of two courses may be followed:—

(a) The ulcer may be closed as much as possible, and the gap filled by a plug of omentum, gastro-enterostomy being performed.

(b) The opening may be used for the performance of temporary duodenostomy.

The two methods are both unsatisfactory and are only to be used in the last stage of the emergency.

The questions of irrigation and of drainage are decided by the extent and quality of the peritoneal contamination or infection.

COMPLICATIONS.

(1) *Subphrenic Abscess.*—This is perhaps the most serious of all. It is due to an extension of the contamination or infection which spreads from the site of perforation in consequence of the extravasation of the contents of the stomach or duodenum. It is slightly more common on the left side in cases of gastric ulcer; on the right side in cases of duodenal ulcer; but each variety of ulcer may cause an abscess upon either side. The evidences of its development do not, as a rule, begin until after the fifth day; by the tenth day they are usually definite. From this time their severity increases rapidly unless relief is given.

(2) *Residual Abscess.*—The material extravasated from the ulcer, together with the fluid poured out freely from the peritoneum, may collect in small or large amounts in various parts of the abdominal cavity. In consequence of adhesions which so quickly form, some fluid may be shut off, increase in quantity, and because of the infection rarely virulent, but never absent, result in the formation of an abscess. Gravity decides that the pelvis shall be most frequently the site of such a collection.

The signs which result depend therefore upon the position taken by the collection of fluid. If the pelvis is filled, a swelling recognised most easily, and in an earlier stage, by rectal examination will develop. An absence of mucus in the stools for a few days is the signal that proctitis is present; and the rectum must then be examined. The finger impinges upon a tense, doughy swelling which feels as though a tennis ball were impacted deep in the pelvis. Day by day this bulging of the anterior wall of the rectum will increase; and if there is no urgency may be allowed to increase until it is evident that a quite definitely circumscribed abscess is present. Then a small opening made by one thrust of the sharp end of a pair of scissors will open the abscess, and its contents will soon drain away. Rectal drainage is far preferable to abdominal drainage.

(3) *Parotitis.*—This is among the most serious of all the complications which may follow after this operation. We now recognise that it is due to an infection extending up Stenson's duct from a mouth which has not been kept clean. The prevention of parotitis is a question of careful nursing. It is a tedious matter, no doubt, to have to attend hourly to the toilet of a patient's mouth, clearing away impurities and lodgments, and keeping the mucous membrane moist. But it must be done. The patient must help by flushing the mouth almost incessantly with some agreeable, fragrant, slightly antiseptic

fluid; and he may keep his saliva flowing by the use of chewing gum. A dry mouth is not only a discomfort, it is a real danger.

(4) *Pulmonary Complications.*—These are of many kinds. Diaphragmatic pleurisy, empyema, basal pneumonia and pulmonary embolism have all been observed. Infection spreading through the diaphragm is responsible in some cases; and inhalation of vomited material during the operation in others.

(5) *Gastric or Duodenal Fistula.*—This may follow the giving way of the suture which has temporarily closed the base of the ulcer, or may be due to leakage occurring after removal of the tube inserted into the stomach or duodenum through the rent. It is always an extremely serious complication, and in duodenal cases is almost invariably fatal.

The Indigenous Systems of Medicine.

AN interesting and very outspoken address on this subject was delivered by Major D. R. Ranjit Singh at a meeting of the Allahabad Medical Association on Friday, April the 13th, on the occasion of his return from a tour of study in Europe. Major Ranjit Singh's views are that to endow the ancient systems of Indian medicine is to waste the taxpayer's money. We take the following abstracts from his address from the Allahabad *Leader* of April 16th, 1928, with due acknowledgments to our contemporary.

"Ever since my visit to Europe I have been feeling no end of disappointment as regards the backwardness of my country in regard to public health, the low vitality of our nation, the decreased power of resistance, and last but not the least important of all, our appalling mortality all round. These facts may not affect our legislators who are laymen, but surely it strikes me that we who have qualified ourselves in all the branches of modern medical science by virtue of which fact our responsibilities should be proportionately greater, are doing practically nothing to help our dumb millions. There are then some other aspects which have prompted me to sound a note of warning to my countrymen and these are the backward swing of the pendulum as regards the propagation in connection with the revival of the old and obsolete systems of the healing art. The encouragement of the Vaidic and the Unani systems has been so well received by the laity in the Legislative Council that I am conscious of the great anger and opposition that I may arouse by laying before the unsuspecting public the real facts and the dangers to which we are being led by vote-catching legislators. India having admittedly had a glorious past, also possessed its own systems of healing. They are still in vogue and are still being practised largely in the urban areas where our medical graduates unfortunately have not established themselves so far. These systems are undoubtedly thousands of years old, and to my mind are standing to-day where they did thousands of years ago. China, I am sure, boasts of a still older civilization than ours and it would be interesting to know why the Chinese people who are not like us dominated by a foreign Government have not revived their indigenous systems, and why they have taken to modern scientific medical appliances as in every other country such as Egypt, Turkey and Greece, which have quite as old, if not older, civilizations than ourselves. We as medical men ought to be aware of the psychology of the mind that has made the pendulum of our country in our legislatures swing back with such evident disadvantage. I am second to none in admitting that our country possesses thousands of herbs which have very efficacious medicinal properties, but to say that our old systems which have been stagnating during the last two thousand years should be revived as they were, is, I think, nothing else but an irony of fate, and in my humble opinion is on the one hand either based on the ignorance of the legislators or to some extent on their seeking popularity for votes. Imagine that while some of our most useful hospitals are being starved for want of modern

appliances, the legislatures have been granting money lavishly for the Unani and Vaidic systems.

I have been misunderstood before and would not like to be misunderstood again and, therefore, I want to clear the point that while I am a great advocate of getting modern medical science translated in our own vernaculars, I do not want by any means to be a party to putting our country back in the scale of civilization by popularising unscientific, old and obsolete systems. We are all aware of the very commonplace argument trotted out by the advocates of these systems that in our urban and mofussil areas it is only these systems which prevail and that they also claim a certain percentage of cures, but here again we medical men are fully aware of the fact that as long as there is life and vitality there is a constant effort on the part of the diseased system to combat disease and mend itself by a natural process. I, therefore, hold that most of the so-called cures are due to this and not so much to the correct diagnosis and subsequent medication. None can challenge that the modern methods of diagnosis are every day taking us nearer and nearer to correctness, and that there can possibly be no comparison between the old methods of diagnosis and the present diagnosis made by modern appliances such as x-rays, etc. I feel almost confident that if our medical associations took it upon themselves to enlighten the lay public and explain to them the details of this enormous waste of public money which is being allowed in our Councils for reviving the indigenous systems, it will come to a stop.

I call this one of the moral duties of the modern Indian medical practitioners and if you all agree with me, I would ask you to send your formal resolutions protesting against the *callous waste of taxpayers' money in this direction*. I have already referred to the backward condition of our public health and the appalling mortality in our country. I now want to draw your special attention to these two heads and ask you to search your hearts, and say if we medical men have a clear conscience of having done our duty in this matter. I personally hold that here is again a vast field for our activities. Let our medical associations tackle the health problems of the larger towns and advise the local bodies and see that they do their duty and reach the standard of other civilized countries. Indeed I feel that we as practitioners of medicine in our individual capacity can do a lot of good by keeping our eyes on preventive medicine even in our private visits, while a few sentences of friendly advice given to the friends of the patients about certain crude facts of hygiene can go very far.

I have referred also to the decreasing vitality of our nation, and here I ask you to consider whether we have ever given enough thought to this question. The bulk of our population is vegetarian and has always depended on milk and its products as parts of our food. Milk gives us all the necessary ingredients for maintaining our vitality. I am not exaggerating facts when I say that it is almost impossible to get pure and genuine ghee and milk in large towns. While visiting some of the tuberculosis sanatoria in the West I was told by a number of experts that in their opinion it was the milk-shy families which were predisposed to tuberculosis of lungs. Can we not exert our pressure on local bodies and local legislatures to wake up and realize the responsibilities which they owe to the nation and grapple with this measure as best as they can?

Personally, I have always held that a medical man can always be a very useful member of our local boards, as in matters of public health and hygiene our country is admittedly centuries behind the rest of the civilized world. Is it not an irony of fate that here in Allahabad where our medical association has been granted a representation on the local municipal board and where we have an important public health committee, the chairman of even this committee should be a non-medical man?

Another most important question that is being discussed specially in over-populated centres of civilization such as New York, London, Paris, Berlin and Vienna is the question of the ethics of contraception.

In a country like India where starvation looms large at least as far as the masses are concerned, but where the procreative capacity unfortunately is still on the increase, the question whether contraceptive methods should or should not be widely explained to the laity is indeed of momentous importance. Personally I am in favour of enlightening the public on all questions relating to sexual hygiene, prevention of venereal disease, and lastly, though not the least important, the question of contraceptive methods should be explained and taught publicly.

As medical men we might also exert our influence and press the question of civic survey being immediately carried on in all our larger municipalities. And while talking of the subject I am very gratified in informing you that the civic survey of Allahabad which was initiated by me while I was chairman of the Allahabad Improvement Trust, when completed, had really opened my eyes to the gruesome details regarding the infantile and general mortality due to various endemic and epidemic causes in our town. Indeed, I felt very much gratified when the Secretary of the Garden City Association of London appreciated the civic survey as brought out by the Allahabad Improvement Trust under my administration and said that we had actually taken the wind out of the sails of his association as we had completed a work which they were only contemplating to get done. I believe the Government of Madras have, since, introduced the question of civic survey in their larger municipalities.

League of Nations' Health Organisation Publications.

The attention of public health workers in India may be drawn to a recent small brochure published by the Health Section, League of Nations, Geneva, giving a list of their publications with notes on each and prices. This was published in March 1928, and copies are available on application to the League. The most important publication, perhaps, is the *International Health Year-Book*, that for 1927 being the third published. Other important publications dealt with are the *Annual Epidemiological Reports*, the *Statistical Handbooks* for different countries, which give details as to methods of collecting and registering vital statistics, the publications of the Malaria Commission, and the reports of Special Studies and Investigations.

The Publications of the Voluntary Service Fund.

We referred on p. 52 of our issue for January 1928 to the work and publications of the Voluntary Service Fund, 36, Friday Street, London, E. C. 4. This Fund is one which runs a strong and vigorous propaganda in Great Britain on behalf of vaccination, and public health workers in India may be interested to know of its publications. We have recently received a more complete set of these publications, a note on which may be of interest to our readers. They include the following:—

(i) *Facts that you ought to know about Small-pox and Vaccination*.—This is a small 8 page pamphlet issued at 2d. each, or 15s. per hundred for general public distribution, illustrated with photographs of small-pox cases. It is very well got up and printed.

(ii) *Small-pox Hints for Health Visitors and Welfare Workers*.—By W. McConnel Wanklyn, M.R.C.S., L.R.C.P., D.P.H. This is an 8 page brochure published at 1s. per copy, giving the necessary information to health visitors and welfare workers about small-pox and vaccination, with notes on how to diagnose the former disease, and on the necessity for vaccination.

(iii) *The Accurate Diagnosis of Small-pox*.—This is a reprint of a post-graduate lecture delivered at the London Hospital Medical College by Dr. Wanklyn, and is sold at 6d. per copy.

(iv) *A Survey of the Present Position of Small-pox and Vaccination as affecting this Country*.—This is a

reprint of an address delivered to the Society of Medical Officers of Health. No price is stated.

(v) In addition to the above, the Fund also issue copies of an extremely striking photograph. This shows a mother suffering from small-pox, who was admitted to a small-pox hospital, and delivered there. The infant was vaccinated on the following day and did not contract the disease, although suckled and nursed by the mother. The mother and infant are shown together, and the photograph is a striking one by way of propaganda.

The Voluntary Service Fund also issue several other publications by way of propaganda against small-pox and in favour of vaccination, and will be glad to supply information to enquirers.

A Fraudulent Label.

A TYPICAL instance of what goes on in the Indian drug market has been brought to our notice by the manufacturers of "Sanmetto." Sanmetto is obtained from the saw palmetto tree, and is used as a sedative and diuretic, being prescribed frequently in cases of gonorrhoea. It is manufactured by the Od Chem. Co., New York.

The packages of the spurious product which is being sold on the Indian market are an exact duplicate of the genuine Sanmetto labels, with three interesting differences. In the false label the word "substitute" is printed in place of "substitutes"; the word "of" is transferred from one line to the next; and "prosecution" is misspelt "procecution." Also the heavier leaded type is a little thinner in the spurious label than in the genuine one. Otherwise the two labels are identical. The manufacturers of Sanmetto claim that the drug sold in the spurious packages readily ferments and is most injurious to health.

As matters stand at present in India, we take it that the manufacturers of Sanmetto have no course open to them other than to prosecute the makers of the spurious article in the civil courts in the hope that possibly a conviction may result. This is a most unsatisfactory state of affairs and calls for legislative reform.

Sciatica and its Treatment.

By ANTHONY FEILING, M.D., F.R.C.P.
(*British Med. Journ.*, March 1928, p. 389.)

IN his Hunterian lecture on the subject of sciatica Dr. Feiling dealt with the subject of treatment as follows:—

It is obvious that in this, as in every condition in medicine, successful treatment depends on an accurate diagnosis, although palliative treatment may, of course, temporarily relieve all the symptoms. The treatment of the secondary forms of sciatica is clearly that of the causal factor, but where that is unfortunately not amenable to direct treatment we must be content with methods designed to mitigate discomfort and suffering.

Let us consider first the treatment of those cases where a real neuritis or perineuritis of the nerve is present. As previously indicated, a careful search for etiological factors will have been made, and any diabetic element in the case noted and treated. In the severe and acute cases rest in bed is nearly always essential. The application of a splint to the affected leg is sometimes advised, but in my experience this can seldom be tolerated; indeed, the maintenance of any position of the limb for long at a time is often almost impossible. Undoubtedly the most useful local method for the relief of pain is the application of heat in some form or another, whether this be achieved by poultices, fomentations, radiant heat, or diathermy. The last, when available, is a most useful method. Ultra-violet rays with the mercury vapour lamp or the tungsten are applied locally are also of value in the relief of pain.

Many authorities think highly of the value of electricity, either in the form of the simple constant current or of ionization. I must confess to having been little impressed by these methods of treatment, and now

seldom employ them. For slighter cases some benefit may be derived from counter-irritation, whether this be effected by strong liniments or ointments, or by blisters, or by the old-fashioned method of painting with concentrated hydrochloric acid, but in any severe case such methods are generally of doubtful value. In the early stages of an acute neuritis massage is definitely contra-indicated.

I cannot deal in any detail with all the innumerable drugs which have been used in this disease, either as supposed cures or as mere relievers of pain. Any condition amenable to medicinal treatment, such as constipation or urinary infections which may be a factor in the causation, must, of course, receive prompt treatment. The salicylates and the iodides are about the only drugs which seem to have any direct effect on these cases. The intravenous injection of sodium iodide has been advised, but I cannot say that I have found this method to possess any particular advantage over the ordinary form of medication by the mouth.

Analgesic drugs will nearly always be needed in cases of any severity, especially for the relief of pain at night. Aspirin, phenacetin, phenazone, may all be tried; "dialacain" is a useful compound, and I have also found "allonal" of value. A mixture of drugs which I have found effective is a cachet containing 5 grains of aspirin, 5 grains of pyramidon or amidopyrin, and a small dose of heroin, say one-eighth or one-quarter of a grain. It need hardly be said that the use of morphine should be restricted as much as possible, although in really bad cases its use for a time will be almost imperative.

Cases of sciatic neuritis which do not yield fairly rapidly to treatment along these lines, say in two or three weeks at most, may be very advantageously treated with injections of saline solution into the nerve trunk—a method which marks a distinct advance in our therapeutic armamentarium. This method is particularly indicated in cases where there is definite evidence of the presence of a true neuritis, such as marked tenderness on pressure on the nerve and loss of the ankle-jerk. The best sites for the injection are just below the sacro-sciatic notch and at a point on a level with the tuberosity of the ischium. The method is now well known, so that I need not enter into all the details, but it is important to make certain that the point of the needle should enter the sheath of the nerve before the solution is injected; the sensations of the patient are the best guide to the position of the needle. Pain may be lessened by a preliminary anæsthetization of the skin with novocain and by injecting 1 or 2 c.cm. of the novocain solution into the nerve as soon as the point of the needle enters the nerve sheath. A considerable bulk of saline solution must be injected; I have been in the habit of using 100 c.cm. The pain produced at the time is not as a rule of great severity or of long duration, and can be controlled by an injection of $\frac{1}{2}$ grain of morphine. The patient should remain in bed for at least twenty-four hours after this little operation. In many cases it is advisable to repeat the injection at a different point in the trunk of the nerve after an interval of three or four days.

Another method of value in these cases of sciatic neuritis is the injection of oxygen. A needle and tubing are attached to a cylinder of oxygen, the flow being carefully graduated; the needle is inserted so as to lie in close proximity to the nerve trunk, and enough of the gas is injected to produce a definite ballooning of the tissues.

The stretching of the nerve trunk by forcible manipulations is probably of little service. In a very few cases which have resisted all other methods of treatment it may be justifiable to cut down on the nerve and freely incise the sheath in a longitudinal direction—a procedure which has given relief in cases which had previously proved intractable.

If we believe that we are dealing with a case of "central sciatica," that is sciatica due to vertebral lesions, it will manifestly be of little service to inject the trunk of the nerve. In such cases very great

temporary relief may be obtained by an epidural injection. In this method a needle is passed into the sacro-coccygeal foramen and the solution injected into the epidural space in this region, where it can come into immediate contact with the nerve roots. Various solutions have been used for this purpose—normal saline, novocain, and, what I have always used personally with quite good results, a 40 per cent. solution of antipyrine, of which 10 to 20 c.cm. may easily be injected. It is advisable to anæsthetize the tract of the needle with novocain, and to have the patient either lying on the affected side or in the genu-pectoral position; a long needle is also essential, especially in fat subjects. As a rule, the relief afforded by this manœuvre is almost immediate, and often quite dramatic; it is easily repeated if needed. This last procedure, coupled with the local and continued application of heat in some form or another, is usually successful in relieving most cases of central sciatica. Any focus of infection must be treated, and some help is afforded, I think, by the use of one of the many varieties of so-called protein shock therapy, such as the intramuscular injection of milk or the intravenous injection of *B. coli* or T. A. B. vaccine.

Immobolization is the essential factor in the treatment of these central sciaticas. This is obtained by means of a plaster jacket, to be worn daily for increasing periods until it can be tolerated continuously. It is later replaced by a celluloid corset, which is worn for a prolonged period, six months at least, or even a year.

On the other hand, in the more chronic cases of this kind I have become convinced of the great benefits to be derived by carefully designed manipulations under an anæsthetic. Manipulative treatment, again, according to some observers is the only method of useful treatment in cases believed to be due to chronic subluxations of the sacro-iliac joint. In many of the cases of chronic sciatic pains following trauma, even where there is no reason for thinking that this joint has been affected, much benefit often follows manipulations or mobilization.

Reviews.

ANTHELMINTICS AND THEIR USES IN MEDICAL AND VETERINARY PRACTICE.—By Lieut.-Col. R. N. Chopra, M.D., I.M.S., Professor of Pharmacology, Calcutta School of Tropical Medicine, and Dr. Asa C. Chandler, Ph.D., formerly Hookworm Research Worker, Calcutta School of Tropical Medicine. Baltimore: The Williams & Wilkins Co., 1928. Pp. 291, with 65 figures. Price, \$5.00.

In this book the whole subject of the treatment of worm diseases in man and animals is clearly and fully set forth, and it undoubtedly fills a gap that has existed for a surprisingly long time in the literature of therapeutics. The book is well arranged, being divided into three sections.

Section 1.—General considerations. This deals with the history and evolution of the use of anthelmintics, and a long chapter is devoted to brief references to the parasites of man and animals, which gives a handy bird's-eye view of the subject of worm parasites. One or two omissions in this portion may, however, be noted. *Fasciola hepatica* is not included among the parasites of man, and the genera *Syngamus* and *Oxyuris*, both common parasites of poultry, are not included. Regarding *Syngamus*, however, this omission is rectified in later chapters. There is next a long synoptic key occupying nine pages on the diagnosis of worms and eggs found in faeces. This key is divided into three sections, viz., (1) tapeworm segments and adult nematodes; (2) larvae of tapeworms and nematodes; (3) helminthic ova. The method of construction of this key is unusual in that cross references to points of diagnostic difference are made by using numbers in brackets, which necessitates working backwards as well

as forwards through the key, and at first this is somewhat confusing. Also the inclusion of the nematodes of man and all the domestic animals in a single section somewhat adds to the confusion. There are five plates consisting of sixty-five figures showing most of the worms and eggs found in faeces; the figures of the eggs are excellent and will prove of considerable assistance in diagnosis, but it is doubtful if the outlines of tapeworm segments and such a figure as that of *Trichinella spiralis* will convey much to the reader. One also remarks the omission of the heads of *Tania solium* and *T. saginata*, as well as drawings of *Hymenolepis nana*. There is no indication as to whether any or all of the drawings are original as no acknowledgments are made. The final short chapter of this section is very interesting as it explains how anthelmintic action of drugs depends on their chemical composition.

Section 2.—Anthelmintics acting on parasites in the gut. This is necessarily the longest section of the book, and it gives a full description of the source, chemical composition, toxicology, and methods of use of all the efficient anthelmintics. Not the least useful part of this section is a brief description of many drugs that have been lauded as anthelmintics, but which accurate investigation has shown to be valueless.

Section 3.—This section is also a very complete exposition of our knowledge of the subject up to the present time. In a book of this nature it is naturally necessary for the author to draw on the literature very extensively, for the experience of no single group of workers can cover the treatment of all worm parasites, and that they have made full use of their opportunities is shown by reference to the lengthy bibliography. When one comes to examine this very full list of authorities in detail one is disappointed to find that many of the references are not quoted in the text, and also that numerous authorities are cited in the text, either with or without dates, to which no reference can be found in the bibliography. Also there are some references where the dates in the text and the bibliography do not agree, and in others no dates are given whereby the references may be traced; further, once or twice when joint authors are quoted they are given in one order in the text and in the reverse order in the bibliography, which makes it difficult to trace them. In a few instances it was noted that neither the alphabetical nor chronological order has been strictly followed. There are some errors in spelling and omission of letters from words, but these are infrequent and are so obvious that they will never lead to misreading of the context. The book is well printed in clear large type, and there is a full index enabling rapid reference to any subject. The above criticisms are only those of detail, and in making them the reviewer does not wish to detract from the undoubted value of the book, but draws attention to them in the hope that they may be corrected in future editions. It is a book which everyone concerned with the treatment of worm infections whether of man or animals cannot well afford to be without, and the price, viz., five dollars brings it well within reach of all practitioners.

P. A. MAPLESTONE.

A TREATISE ON KALA-AZAR.—By Ral Dr. Upendranath Brahmachari Bahadur, K.I.H., M.A., M.D., Ph.D., Fellow of the Asiatic Society of Bengal. London: John Bale, Sons and Danielsson, 1928. Pp. 252, with 12 plates, mostly in colour, and 39 other illustrations. Price, 21s. net.

THE first impression which one obtains on glancing through this sumptuous book is the extremely high standard of publication reached. The author and publishers alike are to be most warmly congratulated on the get up and appearance of the volume. It is printed throughout on the very best quality of paper, it is profusely illustrated with colour plates which are admirably reproduced, whilst the numerous photographs and micro-photographs are excellent. The style of the book indeed far exceeds anything which could have been published in India, and the medical profession in India may well take pride in the publication of such a book, written by an Indian medical research worker of long experience,

and published in so admirable a fashion by British publishers.

The book is largely a translation from the author's chapter on kala-azar in Mense's *Handbuch der Tropen Krankheiten*, Vol. IV (1926), but the original chapter has been considerably enlarged and much new matter incorporated.

The first chapter deals with the history, geographical distribution and epidemiology of kala-azar, and is illustrated by a good series of maps very well executed. The aetiology of the disease and the morphology of *Leishmania donovani* are next considered in detail. The author has quoted the early description of the parasite by Leishman (1904), but at that period the true systematic position of *Leishmania donovani* had not been recognised, and Leishman's description is not entirely an accurate one. By way of correcting this, the author has quoted extensively from the description of *Leishmania donovani* given by Christophers, Shortt and Barraud (1926), an account which has always appeared to the reviewer at least to be unnecessarily complicated. Both accounts, however, are historical ones and are perhaps rightly included in a treatise.

After a chapter dealing with inoculation experiments in animals, the author next passes to the difficult subject of the transmission of the disease, and here we have an admirable summary of the many years of work carried out by a host of different workers, and of all the conflicting views which have been put forward. The recent work on the sandfly *P. argentipes* is very well summarised, though we are nowhere informed what view the author himself takes on the transmission problem. He quotes, without comment, Shortt's final summing up against the view that *Leishmania donovani* is a natural insect herpetomonad.

Chapters 9, 10, 11 and 12 deal with the symptomatology, complications, diagnosis and differential diagnosis of the disease. In the reviewer's opinion this is undoubtedly the most admirable section of this fine book. It is written by a clinician with a life-long experience of kala-azar; the photographs and temperature charts are excellent, the tables for differential diagnosis useful. Throughout, adult kala-azar is differentiated and described separately from infantile kala-azar. In Chapter 13, the pathology of the kala-azar is very fully dealt with, illustrated by coloured plates and original micro-photographs.

The reader will naturally turn to the chapter on treatment with much interest, since the author is the discoverer of urea-stibamine, and he will not be disappointed. The full history of the discovery of the drug, and of the consecutive papers published on it is given. A summary is also given of the author's work on the relationship between the chemical constitution of the antimony compounds and their therapeutic properties, and of papers read at the Seventh Congress of the Far Eastern Association of Tropical Medicine held in Calcutta in December, 1927. Every different method of treatment is described, including even the oral administration of antimony in Castellani's mixture, and the author's special technique for the intravenous injection of metallic antimony. There is no doubt that Dr. Brahmachari's discovery of urea-stibamine is the most outstanding contribution which he has made to the progress of tropical medicine, and his own account of his discovery is of great interest. We think, however, that the author might have given more credit to Professor Schmitz for his many years of patient investigation into the pentavalent antimony compounds. Once the pentavalent arsenical compounds had been introduced for the treatment of trypanosomiasis, the testing of the possible pentavalent antimony compounds in the treatment of kala-azar was almost inevitable, and workers in Germany and Great Britain investigated the problem, as well as Dr. Brahmachari in India. The first compound produced and tested (in 1916) was stibenyl; this gave good results in Europe, but poor results in India. In 1921, Dr. Brahmachari discovered that urea could combine with stibanilic acid, and this resulted in the production of urea-stibamine. Whilst the urea-stibamine

treatment is undoubtedly in universal use to-day, and whilst it has saved thousands of lives in Assam and Bengal, the testing of other compounds should be proceeded with.

Chapter 16, which gives an account of "dermal leishmanoid," is again original and profusely illustrated with coloured plates and micro-photographs, though the patient depicted in Plate IX appears to have become more jaundiced since his portrait first appeared in this journal in 1922. In the section on prophylaxis a useful abstract is given from the official instructions in Assam for the treatment of cases.

In the appendix, laboratory methods are given in full detail. Plate XII, of the normal and abnormal cells of the blood, taken from Knowles' and Senior-White's *Malaria, its Investigation and Control*, has been very much better reproduced from the original drawing in this book than in the former work. The addendum gives an account of recent work in China, a further account of the histo-pathology of the disease as experimentally induced in hamsters, and draws attention to the recent, thick film methods of Shortt and of Brahmachari and Sen.

The bibliography contains some 2,000 references, and will prove invaluable to workers on kala-azar; it includes all the papers by workers on Indian and Mediterranean kala-azar. Though it has clearly been put together with great care, it is not quite free from mistakes; thus of the seven papers by B. M. Das Gupta cited, four are incorrectly referred to A. S. Das Gupta.

We must warmly congratulate Dr. Brahmachari on the publication of this volume, whilst India may take a legitimate pride in so fine a work by an Indian worker.

R. K.

ANNALS OF THE PICKETT-THOMSON RESEARCH LABORATORY. VOL. III. RESEARCHES ON THE STREPTOCOCCI.—Edited by David Thomson, O.B.E., M.B., Ch.B., D.P.H. London: Baillière, Tindall and Cox, 1927. Pp. 301, with 57 plates and 5 coloured plates. Price, 42s. net.

THIS third volume of the Annals of the Pickett-Thomson Research Laboratory is a monograph on the streptococci, or rather it is the first half of a two volume monograph on this subject. The main part of the volume—and to the general medical bacteriologist by far the most valuable—is contributed by Drs. David and Robert Thomson, the Honorary Director and Pathologist, respectively, of the laboratory. They have attempted, as they claim, to compile a reference work of value to the research worker and to present to him a more or less organised mass of information on the work which has been done on the subject up to the present time, and they have certainly succeeded. In two hundred and fifty pages they give a brief résumé of all the important work that has been done on the subject, to which they add their own personal experience and their own opinions wherever views of different workers are divergent; these pages together with the excellent bibliography of more than one thousand references justify its position in the library of any well equipped bacteriological laboratory, and make it a *sine qua non* to the research worker who proposes to tackle this very difficult subject.

There is a chapter on the differentiation and classification of non-hæmolytic streptococci by the use of Crow's medium, written by Dr. H. Warren Crow himself. He points out that the technique of the preparation of the medium is a point of great importance; it seems a pity where accuracy is so essential that a few lines later he refers to peptone or trypsin agar of the "usual reaction." The reviewer feels compelled to admit that he had considerable difficulty in following Crow's method of classification. One sees its value as of a rapid method by which the non-hæmolytic streptococci can be put into certain big groups, but one cannot help feeling that the average bacteriologist's sense of shape and colour are not sufficiently well developed to make this a method of universal adoption.

With its large clear type and the beautiful illustrations the book compares very favourably with many of the valuable limited editions of the private presses.

L. E. N.

DEMONSTRATIONS OF PHYSICAL SIGNS IN CLINICAL SURGERY.—By Hamilton Bailey, F.R.C.S. (Eng.). Bristol: John Wright and Sons, Ltd., 1927. Pp. 217, with 261 illustrations, some in colour. Price, 21s. net.

HOWEVER much laboratory and other auxiliary methods of diagnosis may advance, the history and physical methods of examination must always remain the main roads to a diagnosis. Students are apt to forget this fact until it is brought sharply to their notice by an examiner, who is not content with a written report on a case but insists on watching how the candidate sets about the examination of a patient. A very few minutes will enable the experienced to decide whether a candidate knows his clinical work or not. This book, which is on much the same lines as Legars' more ambitious work, is an epitome of a course of demonstrations on physical signs delivered to students, and it should not only be helpful to them but to junior teachers also. Some general physical signs such as fluctuation, translucency, crepitus, pulsation are first dealt with, after which the regions of the body are systematically surveyed and the methods of examination detailed with brief references to special signs of which quite an amazing number are given, many of them little known. If the information is somewhat disjointed in its arrangement, it is nevertheless very sound and its value is much enhanced by the numerous excellent illustrations of methods of examination, some of the coloured plates indeed are quite works of art. The book is one which we can recommend both to students and teachers, since it collects in one handy volume much that is scattered and difficult to find in large textbooks. We hope that in a future edition which is sure to be needed the author will delete the passage quoted from Shakespeare on page 153; it is not mnemonic and the meanings read into it are in questionable taste.

W. L. H.

GREEN'S MANUAL OF PATHOLOGY AND MORBID ANATOMY, FOURTEENTH EDITION, 1928. REVISED AND ENLARGED.—By A. Piney, M.D., M.R.C.P. London: Baillière, Tindall and Cox. Pp. viii plus 650, with 8 plates and 261 figures. Price, 21s. net.

THIS is a new edition of a very well-known manual of pathology which needs no introduction. The revising author has done a great deal of re-writing, and many additions have been made, as in the sections dealing with shock, protein intoxication, inflammation, parasites, and nephritis. The section on parasites has been considerably improved and constitutes a useful feature of the book for students in medical schools in India. It is noted that no mention is made of the work on the transmission of *Leishmania* infections by sandflies, and that the terms *Tetramitus* and *Lamblia* are retained for *Chilomastix* and *Giardia*. This work, on account of its excellent arrangement, completeness and low price, can be highly recommended as a textbook for students, and as a work of reference for practitioners.

PRACTICAL BIRTH CONTROL.—By E. A. Hornbrook, with Preface by Sir W. Arbuthnot Lane. London: William Heinemann (Medical Books), Ltd., 1927. Pp. 53. Price, 3s. 6d. net.

THIS small book sets out to improve the health, happiness, morality and well-being of the community, and the author, starting with the promise that marriage is the ultimate goal of all, endeavours to show how intelligent contraception, as apart from sexual abstinence, can achieve happiness and diminish vice and misery.

The book commences with anatomical considerations and then goes on to the various methods which are employed at present. The author is an optimist, and just as the surgeon forgets or does not hear of his

failures; so it is to be presumed the author does not hear, as does the gynæcologist of the multiple failures of any particular "control" panacea, for such except the operative one. Nature will never divulge. The problem is one of the most difficult ones one has to meet in the tropics, for we must admit that yearly conceptions in this country among pure Europeans is not a thing to be advised, for in our experience the child or the mother is apt to suffer as a result of often repeated pregnancies. Apart from financial worries it is probable that three children spread over seven years is the ideal for the European mother in the plains of India, and if by the use of any of the means that are mentioned this ideal can be reached, in our opinion after these births it is kindest and best to advise an operation by which the tubes are tied once and for all, for we are in agreement with the author that such means do very materially conduce to greater marital happiness provided the full pros and cons in every aspect have been considered by the parties concerned. The reviewer has never seen any bad results from tying of the tubes, but it is only fair to state that others including psycho-analysts have recorded cases of a peculiar mental negativity owing to an idea creeping into the mind of the woman that she is incomplete or a nenter. Therefore it is all-important that the surgeon or general practitioner should explain that nothing is removed and that she is in all respects the same except for the two threads occluding the tubes. In connection with this matter of tying the Fallopian tubes, may it be permitted to the reviewer to state that there is no need whatever to open the abdomen provided the appendix is not to be removed at the same time. Scores of times during the last ten years he has purposely tied the tubes via the vaginal route, a very easy operation to the expert, practically painless, and only demanding a stay in bed of a few days. Given the above provisos of mutual consent after the birth of three children, the reviewer is of the opinion that such an operation makes for greater love and happiness in the family of those who are perforce residents in the East during the best and most passionate days of their lives.

V. B. G.-A.

ADVICE TO THE EXPECTANT MOTHER ON THE CARE OF HER HEALTH.—By Professor F. J. Browne, M.D., D.Sc., F.R.C.S.E. Second Edition. Edinburgh: E. & S. Livingstone, 1928. Pp. 48. Price, 6d. net.

THE author is so well-known that at first one wonders at his writing a popular six-penny booklet on a subject that has been stressed so greatly in recent years; but when one reads the foreword one sees the motif and is repaid. Antenatal care began in 1902 when in response to a popular appeal, Dr. John W. Ballantyne was able to announce that an anonymous donor had endowed a bed for the care of an expectant mother in Edinburgh. This was the first bed in the world to be set apart for this purpose and from that small beginning, inspired by the genius and forethought of Dr. Ballantyne, has sprung the antenatal care movement of every civilised country in the world, for they all have grasped what that meant in the prevention of disease or disaster in the parturient woman. It is not because there is anything new in this cheap little book that the reviewer praises it, but because of that one sentence in the preface—"Antenatal work has spread until it is probably correct to say that there is no civilised country in the world to-day in which the routine care and examination of expectant mothers does not form an important part of obstetric practice." What can India answer to that? What have the popular press and the politicians of the people done for this? Surely the voices of the women and children can be heard in the land: surely the days of *kismet* and *dharma* and *kharma* have passed; surely this little book or its like could reach into every village and town of India. The vernacular press have done nothing to promote *en masse* the physical welfare of the people; can they not make a beginning and aid the village doctor, who has the knowledge but is not permitted to put it into practice because such things savour

of nonsense in the minds of the old ladies who run the *sage femme* panchayats? Can they not see or grasp what has resulted from that one bed founded in 1902 in Edinburgh—a grain of mustard seed that has spread over the whole civilised world—except India. Will the editors and politicians remain silent to the tears and sorrow and suffering agony of millions who have countless doctors at their doors ready to give skill and attention when once the prejudice to their attendance and care is removed by intelligent propaganda!

V. B. G.-A.

BIRTH INJURIES OF THE CENTRAL NERVOUS SYSTEM.—By F. R. Ford. London: Baillière, Tindall and Cox, 1927. Pp. xiii plus 164, with 56 figures in the text. Price, 18s. net.

THIS is one of the excellent monograph series emanating from the Johns Hopkins Hospital which turn topsy-turvy previous conceptions on the subject, for during recent years we have inclined to attribute all spastic diplegias to injuries received at birth. Dr. Ford states that there is convincing evidence that congenital diplegias are not due to cerebral hæmorrhage at birth, but are due to intrauterine pathological processes. He proves that all the diplegias and spastic paraplegias are the result of faults in cerebral development and that it is only about six per cent. of all the infantile paraplegias that can be attributed to bad obstetrics and that all obstetric palsies are monoplegic or asymmetrical pareses, e.g., Lord Byron or the ex-Kaiser William II.

In this monograph there is a very interesting section written by Crothers and Putnam on birth injuries of the spinal cord, and the conclusions of these authors confirm the experience of the reviewer that all such injuries are the result of traction and not in any way due to intrauterine pathological errors. The reviewer has done scores of immediate post-mortems on infants dying shortly after birth in whom there was palsy of one or other extremity, and in every case there was hæmorrhage into the cord or theca or severe naked-eye laceration of the nerves at the site of their emergence from the spinal vertebræ; for the spinal cord, its membranes and its nerves, are the most fragile and least elastic structures imaginable. Therefore it behoves all teachers of obstetrics that traction with undue force, particularly in breech cases or the birth of the shoulders, is a thing which they should warn all students and nurses against, for we now know that such paralyses are permanent stigmata of ignorance or carelessness on the part of the medical attendant.

V. B. G.-A.

THE PRINCIPLES OF INFANT NUTRITION AND THEIR APPLICATION.—By K. H. Tallerman, M.C., M.D. (Cantab.), M.R.C.P. (Lond.) and C. K. J. Hamilton, M.C., B.M. (Oxon.), M.R.C.P. (Lond.). London: William Heinemann (Medical Books), Ltd., 1928. Pp. 103. Price, 10s. net.

The Principles of Infant Nutrition and Their Practical Application is a very useful addition to the books recently published on the subject. The chapter on physiology and bacteriology is excellent with a clear and up-to-date account of the vitamins: the anti-rachitic element is called vitamin D and is a separate entity from fat-soluble A. Nutritional requirements are fully discussed and it is recommended that calculations should be made on a caloric basis instead of on so many ounces per lb. body-weight. From the practical point of view, one is pleased to see the equivalent of calories of milk given in ounces, as well as in cubic centimetres. The example on page 37, illustrating the method of calculating the caloric intake, is, unfortunately confusing and contradictory; four-hourly and three-hourly feeds are confused and consequently five feeds and seven feeds per day are mixed up. Breast-feeding is thoroughly described and it is pointed out that breast milk must not always be assumed to contain an adequate vitamin content. The care of the premature infant is well described in detail, both for the breast-fed and the artificially fed; for the

latter, skimmed lactic acid milk with carbohydrate added up to seven per cent. is recommended.

The thirty pages devoted to the artificial feeding of normal infants are clear, concise and up-to-date, and will repay the general practitioner's time spent in reading them. They contain an excellent account of the various modifications of cow's milk. The authors (as well as Paterson and Smith in their *Modern Methods of Feeding in Infancy and Childhood*) recommend dried milks as being, (a) cleaner than cow's milk, (b) more easily digested, (c) more constant in composition, (d) having a vitamine content that is very little affected and easily replaced. One hopes that in time the recent prejudice against dried milks will die down in Calcutta, as it has disappeared in London, and that the hospitals in Calcutta will not fear to recommend them any more than does Great Ormonde St. Hospital for sick children: cod-liver oil and fruit juice must, of course, be given. The nutritional disorders of infancy are discussed in Chapter VII. The terms "marasmus" and "wasting" are discarded in favour of "athrepsia" and "hypothrepsia." This chapter is very well written and the examples of dieting given are excellent. One noticed, however, that in the treatment of acute gastro-enteritis, gastric and rectal lavage are only very grudgingly mentioned, almost at the end: surely they deserve a more prominent place. The diet during the period of weaning is thoroughly discussed and precise directions are given.

The appendix, in which the methods of preparing various modifications of cow's milk and also the methods of preparing the feeds in later infancy, is excellent. There is a bibliography at the end of each chapter. The criticisms we have to make are so few and the work is otherwise so excellent that we can strongly recommend the book alike to the specialist and the general practitioner.

S. A. McS.

OUTLINES OF SCIENTIFIC ANATOMY FOR STUDENTS OF BIOLOGY AND MEDICINE.—By Dr. W. Lubosch. Translated from the German, by H. H. Woollard, M.D. London: John Bale, Sons and Danielsson, Ltd., 1928. Pp. 392, with 66 illustrations. Price, 21s. net.

This book does not purpose to teach human anatomy as such, and its use presupposes such knowledge and study of the facts of anatomy as would be obtained from good textbooks and practical work. In the introduction to the general part, while discussing the position of anatomy in the system of science, the author has rightly said that "Anatomy is to be looked on not only as the foundation but as the principal science of medicine." The general part deals with (i) life, its appreciation and objectivation; (ii) general morphology and etiology. The special part deals with the special (i) morphology and (ii) morphogenesis of man; (iii) the morphology of the tissues, and (iv) cytomorphology and leptonomorphology. The author has made the conception of life quite clear, and has dealt with the objective features of all living things under three heads, viz., organisation, individuality, and suitability to purpose. The special morphology of man has been dealt under three heads, viz., (i) man as an individual, (ii) man as member of the race, and (iii) man as a member of a higher category. In the promorphology of man the segmental anatomy of man has been thoroughly dealt with, especially from a comparative standpoint. The divisions of the human body have been dealt under (a) trunk and tail, (b) head, (c) neck, (d) extremities, and (e) cavities of the human body. In the morphogenesis of man the general embryology of man has been described in detail. The chapter on morphology of the tissues contains a reasonable classification of the tissues. The last chapter on cytomorphology and leptonomorphology deals exhaustively with cells and the structure of protoplasm. The subject-matter has been dealt with in a masterly way and in minutest detail with special reference to comparative anatomy, and the reader will derive much useful knowledge from this book. We recommend this book to every student of both biology and anatomy.

CARE OF THE TEETH OR LAYMAN'S HANDBOOK OF DENTISTRY.—By Minoo C. Bilpodiwala, M.B., B.S., Dental Surgeon, Bombay. Pp. 134, with 18 illustrations. Published by the author, Empire Building, Hornby Road, Bombay, 1927. Price, Rs. 2.

THE care of the mouth and teeth is the one great duty that we owe to ourselves. At the present time public bodies in India are not aware of the duty they owe to those for whose welfare they are responsible in the shape of oral hygiene. This little book is meant for just those people in India. It has a great message to everybody in the realm of personal hygiene. With the passage of time and with our increasing knowledge of the relationship of oral sepsis to systemic diseases, the mouth hygiene movement is taking on greater importance. It is essentially necessary to teach the man in the street the salient points about oral cleanliness for his own sake, as well as for the sake of the community. Dr. Bilpodiwala's book has not come a day too soon, and we hope it will deliver the message that it is intended to deliver to the lay people. The book deals with all the facts about mouth hygiene which everyone should know, and it should be an excellent book for teaching in the hygiene courses in our high schools. The book is printed on antique paper. The printing is not very good and there are several printing mistakes. We hope they will be corrected in subsequent editions.

R. A.

Annual Reports.

THE FIFTY-THIRD ANNUAL REPORT OF THE MISSION TO LEPERS IN INDIA, 1926-27.

THIS report records a year of steady progress. In Bengal, the chief event of the year was the opening in February 1927 of the Kisorilal Jatia Homes at Bankura. These are intended for the special treatment of early cases of leprosy and comprise six two-roomed cottages with verandahs and out-houses, and accommodation for 36 patients; a doctor's house, dispensary, crafts school and bathing platforms. In declaring the new Homes open, Lord Lytton spoke of the cheerful and optimistic atmosphere of the Bankura Leper Hospital. At Purulia in Bihar there were 760 inmates, and this is the largest institution in India under the Mission. During the year the healthy girls' home and two new hospital wards were finished, and the old hospital converted into nurses' rooms, stores, and an operating theatre. The new healthy girls' home is a model institution, with the whole of the upper floor constituting one big airy dormitory well raised above any possibility of dampness during the rains. During 1927 fifteen patients were discharged symptom-free.

At Cuttack a much needed laboratory has been provided by the Local Government, whilst a further improvement is a hospital ward for female patients. At Champa in the Central Provinces four new wards are under construction; at Jahargaon new wards, a doctor's house, and dispensary are being added to the existing buildings; at Chandkuri improvements in the sanitation and water-supply are being carried out. At Naini, Allahabad, plans have been approved for considerable extensions—an additional female ward, extensions to the healthy girls' home; here there are 100 untainted boys and girls who are being educated and trained for useful careers in life; indeed this is one of the most important aspects of the work of the Mission. At Tarn Taran a new home for healthy boys was opened during the year, whilst it is noted that at all three hospitals in the Madras Presidency the accommodation is quite inadequate to meet the demands upon it.

With regard to treatment Dr. R. G. Cochran reports good results. The numbers discharged as symptom-free may not be large, but the number much improved is very

considerable, and many such patients will undoubtedly become free from infection in the course of time. Other patients are being closely watched before being finally discharged. Reports by visitors to the different hospitals of the Mission all tell the same tale; that the outlook in leprosy is now a hopeful one, and not the pessimistic affair that it used to be.

The total number of lepers resident in the different hospitals of the Mission in India during the year was 6,231, together with 815 untainted children. The total expenditure for the year was Rs. 8,38,297, of which Rs. 4,75,306 was contributed by the Mission to Lepers, Rs. 3,28,604 came from Government and Local grants, and Rs. 34,387 from contributions made direct to the Mission's institutions.

The report is one which records steady progress. A special feature of the report is the admirable series of photographs which it includes, showing the different aspects of the work, and the types of buildings.

ANNUAL REPORT ON THE ADMINISTRATION OF JAILS IN THE BENGAL PRESIDENCY, 1926. BY LIEUT.-COL. W. G. HAMILTON, I.M.S. CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT. PRICE, RS. 4.

COLONEL HAMILTON'S reports, as Inspector-General of Prisons, Bengal, are always of special interest since they deal with the fundamental and most difficult problems of jail administration.

The principal items of interest during the year were: (i) the opening of the Reformatory School at Alipore; (ii) the bringing into force of certain sections of the Bengal Children's Act; (iii) the transfer of the quinine tablet industry from the Jail Department to the Cinchona Factory at Mungpoo; and (iv) the starting of a silk industry in the Women's Jail, Calcutta. From July 1926, the Juvenile Jail at Alipore has been run in two sections, one a juvenile jail, as previously; the other a reformatory school under a committee of management, with a Superintendent with technical knowledge in charge of both sections. The juvenile jail section, however, will shortly be closed down, whilst the reformatory school will be transferred to the Education Department, certain sections of the central jails and the jail at Bankura being set aside for young offenders over 16 years of age. Whilst the Children's Act at present only applies to Calcutta, and young children still continue to be sent to jails in the mofussil, it is hoped that the Act will soon be extended to all-Bengal; the only question is one of accommodation. And in this connection Colonel Hamilton gives an account of how juvenile offenders are now tried in London—the result of a personal visit of inspection. The stipendiary magistrate is assisted by two honorary justices, one of whom must be a woman; the courts are held in a public hall and not in the ordinary police court, and there is no dock; the general public are excluded, and a special female police probation officer carefully enquires into the home surroundings of each offender. The system of probation and of reformatory schools is very largely made use of. Everything possible is done to help the juvenile offender and to prevent him becoming a criminal.

Female prisoners constitute a special difficulty. Their total number is very small, and they are mostly very ignorant and slow at learning any new work. At the Presidency Jail a beginning has been made of teaching them silk-spinning, also weaving and stocking-making. A special note of praise is paid to the lady visitors to this jail, who have been regular in their visits and have made several helpful suggestions and have taken great interest in the welfare of the women prisoners.

Simple imprisonment Colonel Hamilton unequivocally condemns as a sentence; there can be nothing more demoralising than for a man to be committed to jail for six months or a year to idle away his time and do nothing. The majority of these prisoners so condemned are illiterate, and have not even the resource of reading. Imprisonment without labour is also against all modern ideas of penal reforms.

The State prisoners and detenus continued to be a cause of great anxiety, for separate and special arrangements have to be made in each jail where this class of prisoner is confined, which were never contemplated when the jails were built. A special committee was appointed during the year to report on discipline and conditions generally in the Bengal jails. Funds were voted to start a Borstal institution in Bengal, and this will be started in the Bankura District Jail, and will admit prisoners of from 16 to 21 years of age. The great success attained by the Borstal system in England is due to the Borstal Association which provides work and help for released Borstal lads, and unless some similar association comes into being in Bengal, the Borstal system is not likely to prove a success.

The problem of the short term prisoner remains unsolved; no less than 2,117 prisoners were committed during the year with sentences of less than one month. In England the alternative of probation and time given for the payment of fines has so greatly lessened the number of prisoners committed for petty offences that no less than 27 local prisons have been closed in England and Wales since 1900. The probation system could well be introduced in Calcutta, but everything depends on getting the right type of probation officer.

Advisory boards for the premature release of prisoners were held at five central jails during the year and recommended that 86 out of 176 prisoners examined should be prematurely released, of whom Government eventually released 77 before their time was up.

Turning to the various statistical statements in the report, there was a definite but slight increase in the number of prisoners under confinement in the Province throughout the year, the daily average being 10,341 as against 10,193 for the previous year. Illiterates constituted 87 per cent. of prisoners admitted. There was a great increase in the number of juvenile prisoners under 16 years of age sent to jail during the year, and Government has again drawn the attention of magistrates to this evil. No corporal punishment for indiscipline was inflicted during the year. Some 36 per cent. of prisoners admitted were habituals or those who had served a previous sentence. Under-trial prisoners were kept on an average for 19 days in non-sessions cases and for an average period of 48 days in sessions cases. There were 12 State prisoners and 53 detenus under incarceration during the year; and they received special treatment under the rules. Head warders and warders are still discontented and have submitted a memorial to Government for the fourth time. Certain improvements were introduced during the year; rewards were given to warders for proficiency in musketry practice, and grants of free railway passes to those proceeding home or returning from leave on the same conditions as apply to police constables. There were 15 escapes among convicts—of whom 11 were recaptured; and 21 escapes among under-trial prisoners. Many convict officers were released under the recommendations of the Advisory Board; this led to a shortage of convict overseers, and prisoners who were not eligible for these appointments had to be utilised in spite of the rules. The total abolition of the convict overseer system is desirable, but cannot at present be effected on grounds of economy. The cost of the entire department during the year was Rs. 23,82,569—a definite decrease on the figure for the previous year.

Turning to the different industries in the jails concerned, the jute mill in the Presidency Jail was closed in November 1926. The Bengal jails and other Bengal institutions receive their supply of metal and wood articles largely from this jail. Mustard oil is also manufactured, and there is an active durrie industry. The Printing Press was transferred to this jail from the Juvenile Jail during the year. The manufacture of quinine tablets from quinine supplied from the Mungpoo Factory was closed down during the year. At Alipore Central Jail the principal industry is the printing of official government forms. At Midnapore Jail the manufacture of police and prison and chaulkidari uniforms is the chief industry, with cane and bamboo work, mat

work and coir industry. The same applies to Rajshahi Central Jail, and also Dacca.

Morbidity and mortality are at minimal figures for the year. The daily average sick were 31.4 per mille, and the death-rate only 13.4 per mille—a figure well below the average for the civil population. Very high in the list of mortality comes pulmonary tuberculosis, responsible for 25 out of 185 deaths, secondly pneumonia with 17 deaths, and third dysentery—always a specially important feature in jails—with 14 deaths. Malaria comes next with 10 deaths, and diarrhoea—(frequently due to infection with the dysentery bacillus of Flexner)—next with no less than 9 deaths. Dysentery and diarrhoea incidence has however shown a very marked falling off in the mortality statistics in the Bengal jails during recent years. Pulmonary tuberculosis is usually present among the patients before their admission to jail. The total earnings of the Jail Department during the year were Rs. 6,03,300. Dacca Central Jail is singled out in the covering Government resolution for its now flourishing industry in the manufacture of woollen blankets.

ANNUAL VACCINATION REPORT, BIHAR AND ORISSA, 1926-1927. BY LIEUT.-COL. J. A. S. PHILLIPS, D.P.H., I.M.S., PATNA, SUPDT., GOVT. PRINTING, B. & O. PRICE, RE. 0-14-0.

This report follows much on the usual lines. Lieut.-Col. W. C. Ross, I.M.S., held charge until April 1926, and Lieut.-Col. J. A. S. Phillips for the rest of the year. Capt. S. L. Mitra, I.M.S., was in charge of the South Bihar Circle, Dr. J. L. Das of the North Bihar Circle, and Dr. T. Sebastian of the Chota Nagpur and Orissa Circle and of the Vaccine Depot at Namkum. The inspecting staff consisted of 20 district inspectors, 69 sub-inspectors, whilst 1,111 licensed and 278 paid vaccinators were employed during the year.

The total number of vaccinations during the year was 1,351,084, and represented a definite increase on the previous year. This was largely due to the widespread epidemic of small-pox in the Province during the year, and Col. Phillips notes that the opposition of parents shows no signs of diminishing. Of these vaccinations 1,130,934 were primary vaccinations, and 201,378 re-vaccinations. The success rates were 97.64 per cent. for primary vaccinations, and 48.80 per cent. for re-vaccinations. Most of the individual districts reported a definite increase of vaccination, but there was a marked decrease in Puri and Singhbhum.

A special feature of the report is that in the Orissa Feudatory States where vaccination and re-vaccination are practically compulsory in the majority of the States, results are eminently satisfactory and the population well protected; on the other hand in non-compulsory areas and especially towns some 50 per cent. of the children may not be protected. More than half the total operations are carried out on children over one year of age; in fact it is increasingly clear that Indian parents have the greatest objection to the vaccination of infants of less than one year of age, but much less objection to the vaccination of infants over that age.

Small-pox is endemic in the Province and will continue to be so until and unless vaccination and re-vaccination are made compulsory. During the last ten years the incidence of small-pox in the Province has steadily increased, and the year saw the culmination of one of the regular five to six years increases in epidemicity. The provincial mortality from small-pox during the five years ending with the present report, per mille, was respectively 0.07, 0.11, 0.24, 0.67 and 1.05, and the last figure suggests that the epidemic peak had about been reached.

In a few trenchant sentences Colonel Phillips discusses the difficult question of compulsory vaccination and re-vaccination. Nothing less will control epidemic small-pox in India. Free and compulsory vaccination and re-vaccination, he considers, alone will protect the population; nothing less is any use. On the other hand, "democratic" India—following the lead of Great

Britain—is gradually becoming less and less protected against small-pox.

The supply of lymph for the Province came from the Namkum Depot throughout the year. A very large reserve is always held in hand against sudden epidemic outbreaks; the average cost of the lymph works out at 1.14 pies per dose, and the average cost per successful vaccination at 2 annas 1 pie. The net profit made at the Namkum Depot during the year was Rs. 3,454, chiefly derived from the sale of vaccine lymph to Bengal. The Depot worked very satisfactorily during the year, and with the recent duplication of the cold storage plant the troubles of previous years have disappeared. Research work was carried on with regard to maintaining a low temperature in the bamboo reeds in which the vaccine lymph tubes are supplied during the hot weather, and on methods of destroying extraneous germs in the vaccine without affecting its potency.

A report which, on the whole, is typical of present-day conditions in India. As has often been remarked "fear is the greatest single stimulus towards hygienic reform." A thorough-going small-pox epidemic throughout India might go far towards deleting the non-co-operators, and encouraging the introduction of compulsory and necessary legislation with regard to vaccination.

REPORT ON MEDICAL AND HEALTH WORK DONE IN THE SUDAN FOR THE YEAR 1926.

This report covers a large and interesting field of work. The population and the conditions of life vary from the most primitive to the modern. The province of Khartoum has a special health staff; the Sudan in general is under the Sudan Medical Staff Service, while the Principal Medical Officer of the Sudan Defence Force submits a special report on sleeping-sickness.

In Khartoum, dysenteries and typhoid fever appear to be the main causes of morbidity; malaria is comparatively low, while sandfly fever was common. Omdurman on the other side of the river has been improved by being provided with a pure water supply and electric light. The water supply is taken from the Nile and purified by a Paterson Filter and chlorination.

The British Sanitary Inspector is the mainstay of the sanitary administration, and the staff is doing excellent sanitary work. The death-rate was 14.45 and the birth-rate 25 per 1,000. In the Sudan province one is struck by the number of diseases present, relapsing fever, typhoid, influenza, measles, whooping cough, rabies, malaria, syphilis, bilharziasis, yaws, kala-azar, tuberculosis, dysentery, leprosy, goitre, endemic hydrocele, ankylostomiasis, trachoma and Malta fever and sleeping-sickness are all present in a more or less high degree—and the report has something interesting to say about each.

Malaria is the most serious of the endemic diseases. In the North it is connected with irrigation gardens, in the South during the rains, it is endemic all over. Bilharziasis is dealt with by prohibiting bilharzial infected people entering into snail-infested areas (unless such cases undergo treatment at a quarantine centre), by using copper sulphate for killing snails in the fresh water canals, and the prevention of contamination of water channels with excreta. There are some interesting problems—the lakes are dry from the end of March until the rains—yet they are constantly infected with bilharzial snails despite the fact that snails die after 24 hours drying and the dry beds of the lakes show no snails. Yaws is a serious problem in many parts. Kala-azar is endemic in the Blue Nile valley.

Most of the dysentery is recorded as "amœbic." The bacillary type is more commonly of the "Flexner" variety. Endemic hydrocele is an affection common in the Abyssinian border. Here 20 to 25 per cent. of the male population are affected; it is probably filarial in origin.

The report on sleeping-sickness is of special interest. Since 1911 the Sudan has had two epidemics of this disease. One epidemic has come and gone—the second

is declining. The population are a primitive people living in isolated families—the result of old Arab slave raids. They are now being taught communal life and the result of this is a rapid fall in sleeping-sickness incidence. This measure has also allowed cleared fly-free watering places to be established. Bi-monthly inspections of the whole district affected are carried out and measures adopted in infected places. £17,000 is being spent annually in the Sudan on measures against sleeping-sickness. Measures are successful in the Sudan, but the surrounding infected areas are not doing the same—the Uganda, Belgian Congo and the French Congo are infected and remain a danger to the Sudan. It is up to these other areas to adopt similar measures. This report is of great interest and records a great amount of general and special work carried out by the service and public health staff of the province.

A. D. S.

THE SCHOOL OF SANITATION AND PUBLIC HEALTH OF THE UNIVERSITY OF THE PHILIPPINES, 1927-28.

It is now recognised that for the furthering of an enlightened health policy in any country, the most important single factor is a competent health officer. Opportunities for the training of such a health staff until lately were wanting in the Philippine Islands, but the University of the Philippines has lately established an up-to-date training school for health officers where medical men already in or intending to join the State Health Service can receive an adequate training to fit them for their work. The formation of the school is due to the activities of Dr. Calderon, the Director of the School, who was able to convince the authorities of the necessity for such an institution. The school is staffed by the present personnel in the staffs of the College of Medicine, University of the Philippines, the Health Service, the International Health Division of the Rockefeller Foundation, the United Service and the Medical Corps of the U. S. Army. It is housed temporarily in the College of Medicine. The library of the Bureau of Science is available.

The number of students is limited to 15. The syllabus of instruction is very complete and lasts for 9 months; the course being divided into three periods of three months each. After the completion of the course, students proceed to an examination for the Certificate of Public Health.

We wish the University of the Philippines every success, and congratulate them in their forward step in public health education.

A. D. S.

ANNUAL REPORT, CIVIL HOSPITALS AND DISPENSARIES IN THE MADRAS PRESIDENCY FOR THE YEAR 1926. BY MAJOR-GENERAL F. H. G. HUTCHINSON, C.I.E., K.H.S., I.M.S. MADRAS. SUPDT., GOVT. PRESS. PRICE, RS. 2-6.

DURING the year under review the total number of medical institutions in the Presidency increased from 959 to 1,006, and it is of interest to study the distribution of these. Of the total, 63 were Government institutions, 22 were State-aided, 773 were municipal, local fund or rural, 29 private aided, 67 private non-aided, and 52 railway dispensaries.

The total number of in-patients treated rose from 149,988 in the previous year to 159,043 in 1926, whilst the death-rate among them fell from 5.23 to 5.06. In the out-patient departments of the various institutions a total of no less than 10,059,359 patients were treated. (Government is often taken to task for neglecting the extension of medical relief in rural areas; but figures on so colossal a scale show how enormous has been the extension of facilities for medical aid in India during recent decades.) Prominent in the list of the chief diseases responsible come malaria, respiratory diseases,

dysentery and syphilis. Some idea of how prevalent venereal diseases are in India may be gained from the fact that 49,233 out-patients attended for treatment of gonorrhoea, and 76,674 for treatment of syphilis. Pulmonary tuberculosis is represented by an out-patient attendance of 21,695. An infection which ranks very high is that with *Ascaris lumbricoides*, for which 263,765 persons were treated. The figures for malignant growths are 1,298 in-patients and 6,044 out-patients. The relative attendance of different castes at hospital is of interest; taking the census figures the attendance of Hindus was 208 per mille, of Mahomedans 433, and of Anglo-Indians and Europeans 413.

Surgical operations totalled 453,346, of which 29,419 are returned as "major operations" with 842 deaths—case-mortality 2.86 per cent. The total income of institutions of Classes I, III and IV during the year was Rs. 58,92,977, out of which the Government contribution amounted to Rs. 34,00,666. The cost of salaries came to Rs. 31,46,167 as against a figure of Rs. 8,45,294 for medicines and Rs. 8,57,072 for diets.

During the year the hookworm survey was completed in the Tamil, Malayalam and Kanarese districts. Egg-counts indicate that by far the heaviest infections are encountered on the West Coast, especially in the Malabar district. The number of persons treated for this infection was 76,587, whilst 978 lantern lectures or cinema demonstrations were given by way of propaganda.

Turning to the question of medical relief in rural areas, up to the end of 1926 Government had sanctioned the opening of 297 rural dispensaries, of which number 225 were open and running during the year. The scheme aims at encouraging private practitioners to settle in rural areas, with the help of a small State subsidy; and it is reported that "the scheme is of enormous potential value to the population of Madras, and has worked satisfactorily on the whole. The unevenness in working the scheme has been very largely a question of the personalities of the medical officers."

Side by side with this scheme has gone a retrenchment in the cadre of Government sub-assistant surgeons; and district boards are now permitted to appoint their own medical officers to local fund institutions other than those at taluk headquarters up to a maximum of one-fourth of the number of sub-assistant surgeons' posts at present held by Government medical officers in the district. The duly approved scheme for training country *dais* has so far been introduced by only 19 local bodies, and only 44 such *dais* were trained during the year. The scheme is at present in its infancy, and it is too soon to pronounce an opinion as regards its success.

Correspondence.

HELMINTHIC FEVER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In his interesting article on "Difficulties in the Diagnosis of Fevers in the Tropics" in the *Indian Medical Gazette* for April, Major J. C. De does not emphasise the frequency of "helminthic" fever.

I give herewith three charts of different types, all apparently due to *Ascaris* infection.

I saw the first case in 1911, since when many cases have come to my notice of fever seemingly due entirely to the presence of some form of intestinal parasite. Such cases are readily cured by an anthelmintic, administered if its exhibition is not obviously contra-indicated.

All these cases were young Mahomedan males.

Case 1 came under my care on the 15th day of his illness.

No malarial parasites were found in his blood.

The tongue was very dirty; spleen not enlarged; no rash.

The action of the bowels was irregular and the pulse relatively slow. He had been classified as a probable

"enteric," but the Widal test on the 16th day was negative. Two days later he passed two ascarides and the following day one. On the 20th day treatment with santonin was begun, but he passed no more worms and thereafter had no further symptoms.

Case 2 gave a history of constipation, fever, and "pains all over." On the evening of his admission to hospital he had headache, burning sensation in the eyes and nose and also on passing urine.

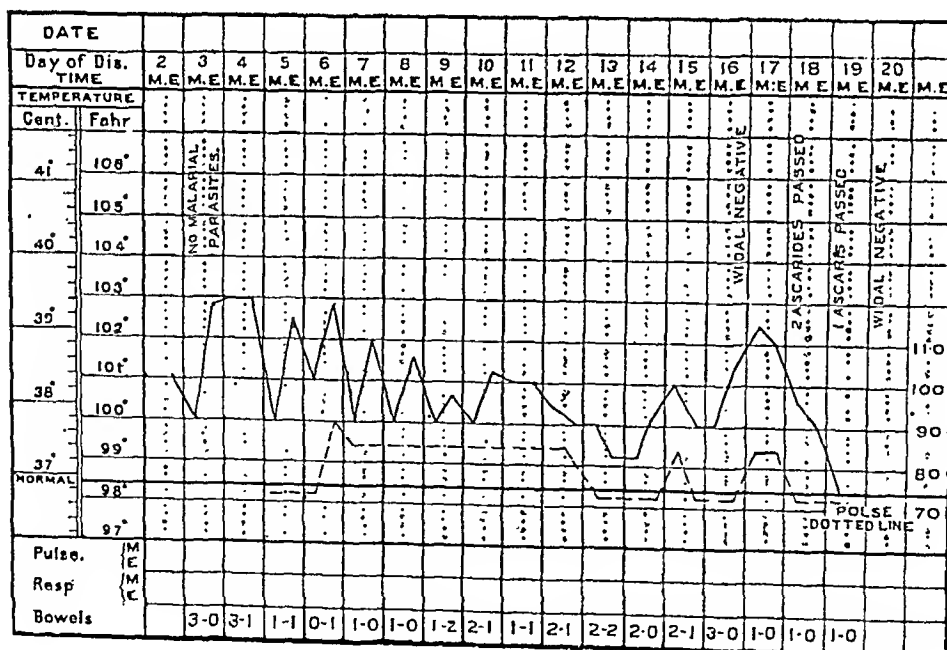
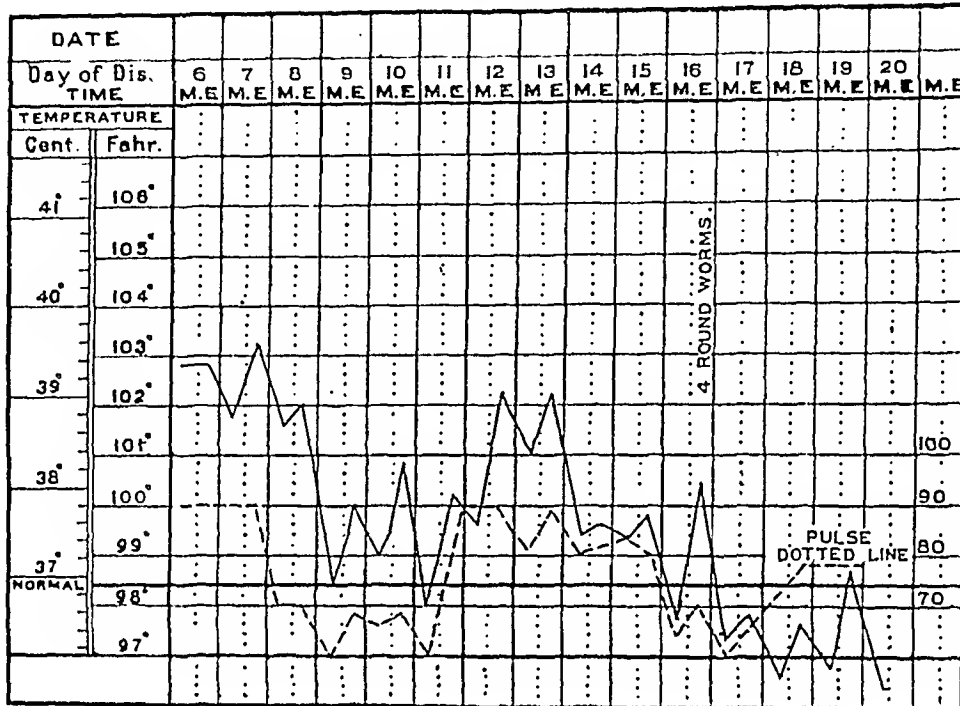
A second course of santonin was given and his symptoms ceased.

No more ascarides were found, but I think it probable that some were passed unobserved.

Case 3 complained of headache, constipation and pain in the small of the back.

There had been a rash (? urticaria) on the abdomen and chest.

The spleen was palpable.



Later there was itching of the skin of the body and he was restless and sleepless.

Blood examination was repeatedly negative for malaria and also for relapsing fever parasites.

On the 16th day of his illness he was given santonin treatment and on the 18th day he passed an Ascaris.

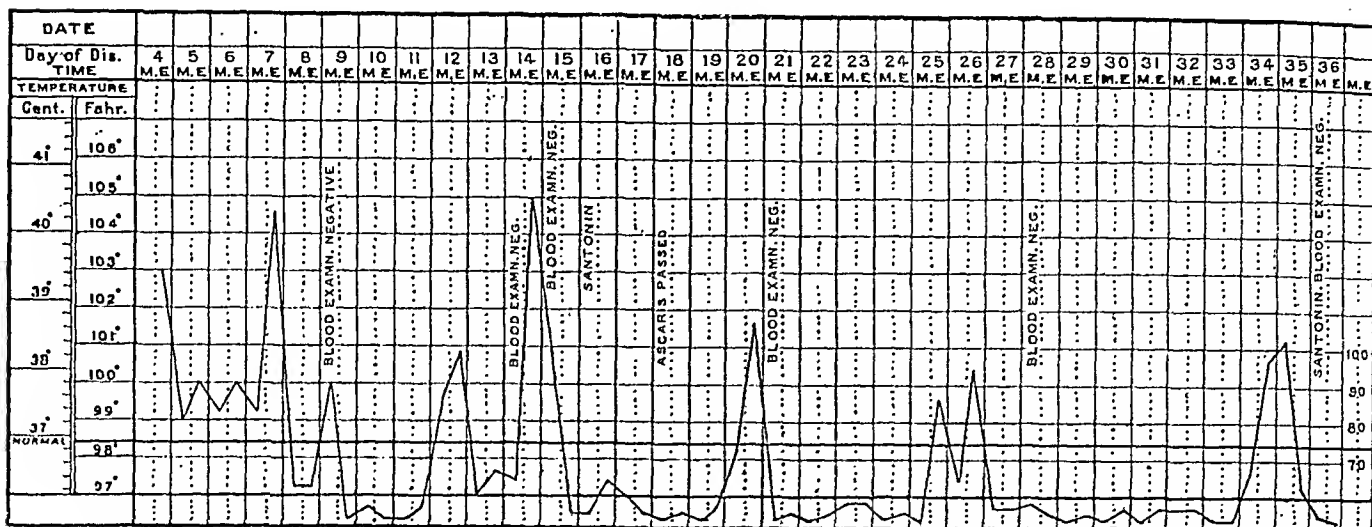
Recurrences of sharp rise of temperature occurred, but blood tests remained negative.

No malaria parasites were found in the blood. While under observation the bowels were irregular in action.

The pulse as in Case 1 was relatively slow.

No facilities existed for a Widal test but the patient was treated as a possible atypical enteric.

On the 16th day of his illness he passed four roundworms, which apparently solved the problem of diagnosis and cure as he had no further symptoms.



No anthelmintic treatment was given in this case.—
Yours, etc.,

L. H. MACKENZIE,
MAJOR, I.M.S.

ABBOTTABAD,
2nd May, 1928.

A CASE OF MULTIPLE ARTHRITIS FOLLOWING SMALL-POX.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the correspondence columns of your issues for May 1927 and January 1928, I find physicians reporting on arthritis as a sequel of small-pox. From my own personal experience of a case now on my hands, I can safely state that multiple arthritis is not an uncommon complication—or rather sequel—of small-pox, especially where sepsis has occurred in the course of the disease. In this particular case encountered in my private practice, the father of the patient (a girl of seven years of age) consulted me because his daughter was suffering from stiffness and swelling of both the knees and elbow joints. The history given was that the patient had had an attack of small-pox a month previously, from which she recovered in about a fortnight, when gradually as a sequel the joints began to swell, movements became painful, and suppuration was present in some. On close examination of the patient I found about the joints the marks of punctures which had been made to evacuate pus. The ends of the long bones were found to be hypertrophied, and ankylosis had already set in in all four joints.

At the time when I was consulted suppuration appeared to have ceased in all the joints, and ankylosis was setting in, the appearance of the affected limbs being typical of that condition.

Unfortunately a photograph of the patient could not be taken for want of facilities in this rural district, otherwise I would have enclosed one.—Yours, etc.,

BRAJALAL GANGOPADHYAY, I.M.F.,
Medical Officer.

CHOIBARI TEA ESTATE,
P. O. BASUGAON, ASSAM.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel G. D. Franklin, O.B.E., I.M.S., an Agency Surgeon, is posted as Civil Surgeon, Ajmer, and Chief Medical Officer in Rajputana, with effect from the 23rd April, 1928.

Lieutenant-Colonel J. R. J. Tyrrell, I.M.S., an Agency Surgeon, is posted as Chief Medical Officer in Central India and Agency Surgeon, Indore, with effect from the 22nd April, 1928.

The services of Lieutenant-Colonel C. H. Reinhold, M.C., I.M.S., are placed at the disposal of the Chief Commissioner, Delhi, with effect from the 22nd April, 1928.

Lieutenant-Colonel W. L. Harnett, M.B., F.R.C.S., I.M.S., officiating Professor of Clinical and Operative Surgery, Medical College, Calcutta, is appointed to do the duties of Principal, Medical College, Calcutta, in addition to his own duties, with effect from the afternoon of the 12th April, 1928.

The services of Lieutenant-Colonel J. M. A. MacMillan, M.D., I.M.S., Civil Surgeon, Simla East, are replaced at the disposal of the Government of the Central Provinces, with effect from the 1st May, 1928.

Major R. L. Vance, I.M.S., is appointed to officiate as an Agency Surgeon and is posted as Chief Medical Officer, Western India States Agency and Residency Surgeon, Rajkot, with effect from the 3rd May, 1928, and until further orders.

Major H. Hingston, M.D., I.M.S., Surgeon to His Excellency the Governor of Bengal, is appointed to hold Medical Charge of the Civil Station of Darjeeling temporarily, in addition to his own duties, with effect from the afternoon of the 7th April, 1928, until further orders.

Major J. C. De, I.M.S., officiating Professor of Clinical Medicine, Medical College, Calcutta, is appointed temporarily to do the duties of Superintendent of the Medical College Hospitals, Calcutta, in addition to his own duties, with effect from the afternoon of the 11th April, 1928.

The services of Major G. B. Hanna, I.M.S., are placed permanently at the disposal of the Government of Bengal, with effect from the 24th October, 1927, for employment in the Jail Department.

Major W. E. R. Dimond, I.M.S., officiating Assistant Director of Public Health, North-West Frontier Province, is confirmed.

Major H. K. Rowntree, M.C., M.D., B.S., I.M.S., is appointed to be Civil Surgeon, Simla East, with effect from the date on which he assumes charge of his duties.

On reversion from foreign service under the Governing Body of the School of Tropical Medicine and Hygiene, Calcutta, Captain G. C. Maitra, I.M.S., of the Medical Research Department, is appointed to officiate as Assistant Director at the Central Research Institute, Kasauli, with effect from the date on which he assumes charge of his duties.

LEAVE.

In modification of previous orders, Major-General G. Tate, M.B., K.H.S., I.M.S., Surgeon-General with the Government of Bengal, is granted leave on average pay

for 5 months and 22 days, with effect from the 26th April, 1928, with permission to affix the Puja Holidays to the leave.

Lieutenant-Colonel D. Heron, I.M.S., an Agency Surgeon, is granted leave on average pay for 6 months and 5 days combined with leave on half average pay for 21 months and 25 days, with effect from the 3rd April, 1928.

Lieutenant-Colonel R. McCarrison, C.I.M., M.D., F.R.C.P., I.M.S., an officer of the Medical Research Department on foreign service under the Indian Research Fund Association, is granted leave on average pay for 8 months, with effect from the date on which he avails himself of the leave. His services are replaced at the disposal of the Director-General, Indian Medical Service, with effect from the date on which he proceeds on leave.

Lieutenant-Colonel J. W. Watson, C.I.E., I.M.S., an Agency Surgeon, is granted leave on average pay for 1 month and 16 days combined with leave on half average pay for 1 month and 14 days, with effect from the 23rd April, 1928.

Lieutenant-Colonel W. J. Simpson, I.M.S., an Agency Surgeon, is granted leave on average pay for 3 months and 15 days, with effect from the 27th April, 1928.

Lieutenant-Colonel W. R. Battye, D.S.O., I.M.S., an Agency Surgeon, is granted leave on average pay for 1 month and 4 days combined with leave on half average pay for 7 months and 25 days, with effect from the 22nd April, 1928.

In modification of previous orders, Captain L. K. Ledger, I.M.S., an officiating Agency Surgeon, is granted leave on average pay for 2 months combined with study leave for 7 months and 7 days and furlough under Military Rules for 2 months and 24 days, with effect from the 16th February, 1928.

PROMOTIONS.

Major to be Lieutenant-Colonel.

Major H. R. B. Gibson, M.D., I.M.S., whose retirement was notified in the London Gazette of 31st December, 1926, is granted the rank of Lieutenant-Colonel, 22nd December, 1926.

Captains to be Majors.

M. T. Khandwalla, M.B. Dated 11th March, 1928.

J. Rodger, M.C. Dated 18th March, 1928.

G. A. Khan, M.B. Dated 23rd March, 1928.

David Clyde. Dated 16th April, 1928.

Lieutenant to be Captain (Provisional).

T. A. Malone. Dated 2nd March, 1928.

RESIGNATIONS.

The undermentioned officer is permitted to resign his commission subject to His Majesty's approval.

Lieutenant J. H. Clapp. Dated 15th June, 1928.

NOTES.

PRIESTLEY, SEER OF AIR.

EVERY physician who administers oxygen, every dentist who gives a whiff of laughing gas, every layman who takes a sip of soda water in midsummer, owe something to Joseph Priestley, scientist and odd genius.

In 1774 he discovered oxygen, and 1928 A. D. marks the 154th anniversary of that epoch-making.

Priestley was most happy when he was in a fight. His temper was ever a fiery one. If it had not been, the world might have missed many things which he gave it. He tried to be a preacher, but his theology was so radical that he could not enter any formal church and started an independent congregation in Birmingham.

His views on politics and social matters were just as pronounced. He brought on himself the rage of his fellow citizens by his expression of his frank opinion

of them in a little book called "Familiar Letters on the Inhabitants of Birmingham," and followed that up with an attack on kings and their ways. He was leading all competitors for the unpopularity contest, when on July 14th, 1791, the anniversary of the French Revolution and the fall of the Bastille, he had a real housewarming party. A mob burned down his little church, and also his home, in which were his library, his apparatus, and the records of his researches.

Then he sailed for America, where he arrived after a stormy voyage of two months, and found peace for a time in Philadelphia. Priestley knew Benjamin Franklin whom he had met through their common interest in electricity, and through him came in close touch with the American Philosophical Society which "Old Ben" had founded. Through that learned organisation he communicated some of his most important discoveries.

Declining the presidency of the University of Pennsylvania, Priestley retired to the little town of Northumberland, Pa. It was in Northumberland that Priestley died and there he was buried in an old churchyard. A movement was recently started to move his house to the campus of the Pennsylvania State College.

It will be remembered that in 1776 Priestley discovered nitrous oxide, or laughing gas, which soon was used as a mild anæsthetic. He made hydrochloric acid and ammonia known to the world and told it, for the first time, what carburetted hydrogen was. To him also goes the credit for the discovery of carbon monoxide. His researches indicated that nitric acid is formed by the passing of electric sparks through the air, and thus he was the pioneer of "airmining," for he made possible the fixation of atmospheric nitrogen.

To this great leader in the realm of pneumatics, we owe the beginnings of many industries which depend upon the use of gases. His analyses of the air started the investigations which resulted in others finding rare elements, such as helium, which, almost as light as the inflammable hydrogen, but as flame-proof as nitrogen, enables airships to be proof against lightning and fire. He pointed the way to the use of the so-called poison gases in chemical warfare and for medicine and industry. Year by year, Priestley, is getting more and more up to date—not only in his chemistry, but in his politics and theology.

His discovery of oxygen, by which he is best known, demolished a time-honoured theory over which scientists puzzled so many years. In order to account for the burning of things, Stahl, the noted chemist and physician, assumed that there was a subtle fluid which combined with ash in inflammable bodies, and escaped when combustion occurs. The flame and the heat was according to this view, the effort of the phlogistin, as Stahl called it to free itself from an affinity. In fact, Priestley called oxygen "dephlogisticated air" at first. The investigations of Scheele, the Swedish chemist, and of Lavoisier, the French scientist, who were also working on the theory of combustion, swept aside the picturesque, but unsound ideas of Stahl, and showed that burning was due to the effect of the oxygen in the air. Of course, their views were bitterly opposed by prejudiced followers of the old idea. The controversy of the "pros" and the "antis" over phlogistin was in fact one of the bitterest which marked science in the eighteenth century. The upholders of the Stahl theory were called phlogistians; the opponents anti-phlogistians, and both names are in modern lexicons.

The name phlogistin, is derived from the Greek word, meaning to burn, or to be inflamed. In these days there has come into the dictionary, Antiphlogistine, the designation of a mineral poultice an inflammation. The remedy in itself is a protest against an unsound practice which research has proved harmful—blood letting. At one time, even learned men maintained that phlebotomy was justified. Modern science has shown that the congestion due to too much fluid can be relieved without recourse to the lancet—and out of

that discovery a new term has come into the vocabularies of many nations.

SPHYGMOMANOMETERS.

WE have received from the Calcutta Pure Drug Co., 41-A, Waterloo Street, Calcutta, specifications of two reliable sphygmomanometers which they stock.

The first is the "Anæroid pattern," No. 5540, which costs Rs. 55. This is of German make, and the special feature of the apparatus is that the index may be adjusted by turning over the cover of the apparatus—a device which we understand is not applicable to any other form of sphygmomanometer on the market. This instrument is of the usual pneumatic pattern, and the case containing it is only some 2 by 5 cms. in size, and its weight 115 gms.

The second, Riva-Rocci pattern, No. 5618, is in a wooden case, and is a mercury manometer. Its price is Rs. 45. It is especially designed to stand transport, and to be safe and reliable. The apparatus is at once ready for use on removing the rubber stopper from the mercury vessel and substituting the ground glass tap. The mercury is contained in a separate bottle in order to minimise risk of breakage and loss in transport. Reports quoted speak very well of the easiness and reliability of this apparatus.

EATAN.

"EATAN" is a dark brown liquid similar in taste to slightly salted meat extract; and stated to consist of a complex of amino-acids and hydrolysates of blood, bones, connective tissue and secretory glands of oxen. It is given in doses of a teaspoonful or less, mixed with soup, milk, or other liquid food, and should never be taken undiluted. This preparation, it is claimed, is of special value in all wasting diseases and in diseases of malnutrition, and especially in chronic tuberculosis of any type. German writers, such as Haff, Basch, Moewes, Bernoulli, Bickel, Braun and Crohen speak of its special value in pulmonary and other forms of tuberculosis, and in chronic osteomyelitis.

According to *The Practitioner*, August 1927, p. 136, "it is indicated and should prove of use in anemia, malnutrition, marasmic disorders, digestive disorders, exhaustion, and in convalescence some physicians have testified to its value in tuberculosis." *The Guy's Hospital Gazette* speaks of it as of value in cases of malnutrition, tuberculosis, osteomyelitis, and inoperable malignant tumours. *The Lancet* states that "it seems worth trial in cases of debility of varied origin."

A very striking series of before-and-after-Eatan treatment is published by Dr. Haff of Munich, who claims that the administration of these hydrolysed protein extracts may bring about an almost complete restoration of the normal condition in patients who are reduced to "skin and bone." His paper is illustrated with some remarkable photographs. Dr. W. Braun, a well known gynaecologist of Berlin, also speaks of it in the highest terms.

In brief, in this preparation we would seem to have an easily assimilable source of the proteins resulting from normal intestinal digestion, and a source of potential strength to the body in all conditions of severe malnutrition and debility. All reports concur in reporting that its assimilation is not attended by any digestive disturbances, and several of them especially emphasise its value in pulmonary tuberculosis.

The agent for the United Kingdom and the British Empire is Alfred Dehez, 28, Bond Street, Surbiton, Surrey, England; and the price is 4s. for a full size bottle, and 2s. 6d. for a half sized bottle.

"CLINICAL EXCERPTS."

Clinical Excerpts is a bi-monthly journal issued by the Havero Trading Co., 15, Clive Street and P. O.

Box No. 2122, Calcutta, the Indian agents for Plasmoquine, Antimosan, Stibosan and other new German synthetic drugs. A recent issue commences with an interesting review by Professor P. Mühlens of Hamburg on chemotherapy in tropical diseases. With regard to plasmoquine he summarises the literature by claiming that it is as efficacious in benign tertian and quartan malaria as quinine, whilst in malignant tertian it has a special gametocidal effect, preventing the production of crescents, but has to be combined with quinine in order to destroy the growing forms. It is stated to be well tolerated by children. Neosalvarsan, in addition to its well known action in syphilis and frambæsia, is stated to be almost a specific for venereal granuloma, also for rat-bite fever, a fever which is not at all uncommon in India. An interesting account is given of the recent work on the anti-rachitic vitamine; this has now been prepared in a state of great purity and very high potency by irradiation of ergosterin, and results with it are stated to be extremely good. "Spirocid," which is stated to be 4-oxy-3-amino-phenyl-arsenic acid, is claimed to be an effective prophylactic agent against frambæsia when taken by the mouth; and of value in the treatment of that disease, as well as of relapsing fever, amœbiasis, and infections with *Giardia intestinalis*.

A series of abstracts from recent literature deal with plasmoquine, where Sliwensky claims that five days' administration will almost always clear the patient's blood-stream of gametocytes; with the value of rectal administration of "Rivanol" in amœbiasis and in chronic tropical colitis of different types; with "Myo-salvarsan", a salvarsan derivative for intramuscular and subcutaneous administration; and with gold salts—"Triphal"—in the treatment of urogenital tuberculosis. An account is given of "Omnadin", which is stated to be a "non-specific immunising vaccine" for the treatment of very varied conditions; it has apparently given good results in typhoid fever—though Maeyama in his account of its use in 31 cases seems to have used the preparation at a late phase of the fever—usually about 30 days after its onset; in general sepsis of varied types in doses of from 0.5 to 2 c.c.; in pneumonia, where the results in children are claimed to have been especially good; and in surgical conditions such as cellulitis and empyema.

The whole number is well got up, and is of interest in its general account of the progress of the German synthetic drug industry.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

Annual Subscription to The Indian Medical Gazette. Rs. 16 including postage, in India. Rs. 18 including postage, abroad.

Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

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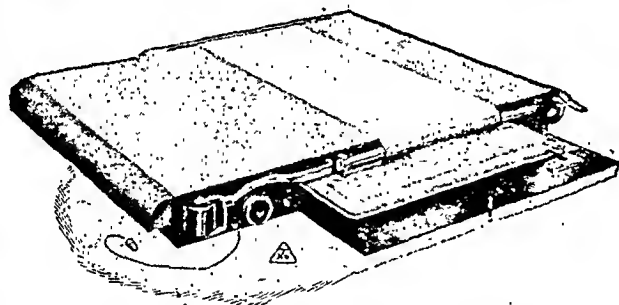
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MAJOR-GENERAL G. TATE, M.D., K.H.S., I.M.S., SURGEON-GENERAL
WITH THE GOVERNMENT OF BENGAL

Far Eastern Association of Tropical Medicine
SEVENTH CONGRESS

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General Organizing Secretary:

LT.-COL. J. CUNNINGHAM, I.M.S.,
ADDRESS: HEAD OFFICE.

The 7th January, 1928.

Messrs. Bengal Immunity Co., Ltd.,
153, Dharamtollah Street, CALCUTTA.

Dear Sir,

On behalf of our Local Committee, I beg to thank your firm for their assistance during the Far Eastern Association of Tropical Medicine 7th Congress just concluded. The demonstrations at your laboratories were very much appreciated by the members who attended, who had an opportunity of seeing what local enterprise could do in biological research and production.

Yours faithfully,

(Sd.) G. TATE,

Major-General, I.M.S.,
Surgeon-General with the Government of Bengal.

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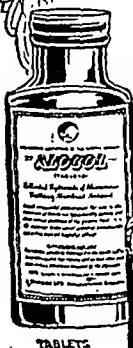
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POWDER

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FURTHER OBSERVATIONS ON THE EPIDEMIC DROPSY FORM OF BERIBERI.

By J. W. D. MEGAW, C.I.E., B.A., M.B.,
COLONEL, I.M.S.,

Formerly Director, Calcutta School of Tropical
Medicine,

S. P. BHATTACHARJI, M.D.,

Assistant Professor of Tropical Medicine, Calcutta
School of Tropical Medicine

and

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THE senior writer has been interested in the subject of epidemic dropsy for more than twenty years and during the past seven years he has had exceptional opportunities for a detailed study of the clinical and epidemiological aspects of the disease. Most of the field work described in this report has been carried out by Dr. Bhattacharji and Dr. Paul under the direction of the senior writer.

For those who are not familiar with the literature of the subject it is necessary to give a very brief summary of the important problems connected with epidemic dropsy and its relationship to beriberi; those who have read the previous papers on the subject can pass on directly to Part II, which deals with the recent clinical and epidemiological observations in connection with the disease.

PART I.

BRIEF SUMMARY OF THE EPIDEMIC DROPSY PROBLEM.

(a) *The Relationship between Epidemic Dropsy and Beriberi.*

Epidemic dropsy is regarded by most workers as one of the forms of beriberi, but we cannot yet dogmatize as to the exact relationship which exists between the two diseases. We believe that it is not yet possible to give a definition of beriberi, as we do not know its cause; our view is that there may be two or more diseases which are included under the old name beriberi. There is one form of the disease with peripheral neuritic manifestations which may well be due to a deficiency of vitamin B in the diet and the majority of modern authors regard it as the only disease to which the name beriberi should be given. If this were the only true beriberi, the study of the disease would be very simple as avitaminosis B is capable of being reproduced with great ease in birds, but most of the cases to which the name beriberi has been given in the

past show cardiac enlargement and oedema of the body, whereas avian avitaminosis is characterised by cardiac atrophy and a drying up of the tissues. We might ignore even these remarkable differences if human beriberi were always associated with deficiency of vitamin B in the diet, but this is far from being the case, as will be seen from the following list of writers, some of whom assert that there was no evidence of vitamin deficiency in connection with the outbreaks observed by them, while others hold that vitamin deficiency cannot account for all the disease manifestations which have been observed.

Horda finds the post-mortem changes to be those resulting from a toxin. McCarrison believes that avitaminosis is one of the factors, but he regards infection as a necessary factor in some cases, and an unknown toxin as a factor in most. Sprawson saw cases in persons whose diet was satisfactory in every observable respect. Boyd, Jauveau Dubreuil, Hofmeister, Mouriquand, Lebrede, Barbe, Mauriac, Wydhooche, Leporini, Miura, Nagayo, Acton, Chopra, Hoffman, Bernard, de Langen, Conto, Fraga Shimazono, etc., all bring forward evidence which convinces them that avitaminosis does not completely explain beriberi. On the other hand Vedder, Shiga, Stanton, Frazer and others regard avitaminosis as the only essential factor, and almost all the writers of modern text-books accept their views without hesitation; many go so far as to regard the deficiency view as being soundly established on an experimental basis. The unanimity of writers of the text-books on the vitamin deficiency view is in remarkable contrast to the difference of opinion which exists among those who have had actual experience of beriberi.

In considering the evidence for and against the vitamin deficiency view it is necessary to remember that beriberi is a name and not an entity, also that the same name may be applied to two or more very different things. It is abundantly clear that many of the outbreaks to which the name beriberi has been applied do not correspond with avian avitaminosis and are not caused by a deficiency of vitamin B in the diet. It would be possible to adopt the drastic course of "disqualifying" all such outbreaks on the grounds that they do not conform to our preconceived ideas regarding beriberi, but such a procedure is thoroughly unjustified as the very outbreaks which cannot be explained on the deficiency view are those which conform most closely with the old descriptions of beriberi.

Using the word beriberi as a name for cases of disease which show certain manifestations, we are faced with the fact that there are various kinds of beriberi and that no satisfactory classification of these has yet been arrived at. One great cause of confusion is that many of those who have discussed outbreaks of beriberi have contented themselves with saying that they saw so many "cases of beriberi"; they give no details of the clinical manifestations of the disease which they observed, and so we have no means of

judging whether the various writers are describing the same disease or different diseases.

But if we use the word beriberi in the only way that is yet justifiable, viz., as a name for disease manifestations which correspond with those described by the old writers on beriberi, and if we admit that two or more diseases may have been included under this name it will not be permissible to state as a simple dogma that beriberi is caused by deficiency of vitamin B in the diet.

These preliminary remarks are intended to show that there is still a beriberi problem in spite of the fact that the modern text-books are almost unanimous in asserting that the final decision has already been reached on the question.

Does Epidemic Dropsy fall within the Beriberi Disease group?

If we divest ourselves of preconceived ideas as to the causation of beriberi and approach the subject of epidemic dropsy with open minds, the first striking feature of this disease is that all the chief hypotheses which have been advanced with regard to beriberi have also been put forward as explanations of epidemic dropsy. Infection, food-poisoning, and vitamin deficiency are the most prominent of these.

The other chief points of resemblance are:—

(1) Both are essentially diseases of rice eaters; exceptional cases or outbreaks of both diseases

have been described as occurring in persons who had not eaten rice, but these are remarkably few.

In these exceptional outbreaks there is no evidence on record to show that the surreptitious eating of rice has been excluded or that rice had not been used to adulterate the flour which was in use.

Even if there were complete proof of the rare occurrence of a disease resembling beriberi among people who have not eaten rice, it would still be permissible to state as a broad general truth that beriberi and epidemic dropsy are essentially diseases of rice eaters.

(2) The geographical distributions of the two diseases dovetail into each other in India so exactly that if a map of the distribution of beriberi is made a gap will be found in and around Calcutta; this will be filled in when the distribution of epidemic dropsy is inserted in the map (*see* Map I).

(3) The seasonal distribution of the two diseases although capricious in certain cases is remarkably similar on the whole (*see* Chart 4) Beriberi in Japan and in Burma is most common at the same season as epidemic dropsy in Bengal.

(4) Both diseases tend to occur as family, institutional or place outbreaks, often in the absence of any obvious change in the diets of the persons concerned.

(5) The age distribution of both diseases is very similar if we leave out of account infantile beriberi which will be discussed later.

Speculative Classification of Beriberi and Diseases which Simulate Beriberi.

I. Diseases associated with errors and deficiencies of diet.			II. Diseases which are probably due to rice-intoxication or toxi-infection.		
Probable Causes.	(a) Due to deficiency of calories, vitamins, etc.	(b) Due to deficiency of vitamin B in the diet.	(a) Intoxication by poisoned over milled rice.	(b) Intoxication by poisoned over milled rice.	(c) Intoxication by parboiled and under-milled rice.
Name of Disease.	Famine œdema.	Avitaminosis B.* (When this disease occurs it is probably called beriberi.)	Dry beriberi.	Wet beriberi.	Epidemic dropsy form of beriberi.
Clinical Features.	œdema. Cardiac depression. Polyneuritis not noted.	No œdema. Cardiac excitation absent. Polyneuritis.	No œdema. Cardiac excitation. Polyneuritis.	œdema. Cardiac excitation. Polyneuritis usual.	œdema. Cardiac excitation. Polyneuritis in 10–50 per cent.
Remarks.		* This name is proposed for those beriberi-like diseases in which there is polyneuritis without cardiac manifestations or œdema, and in which the diet is known to have been deficient in vitamin B.	May follow or precede wet beriberi.	May follow or precede dry beriberi.	Cannot be differentiated with certainty from wet beriberi but fever and gastrointestinal symptoms are more pronounced. Glaucoma is common. Polyneuritis is not so pronounced as a rule.

It is obvious that combinations of the above causes may be at work, for example, vitamin B deficiency and rice-intoxication may co-exist and it may be difficult to assign to each factor its relative importance.

(6) There is no reliable clinical criterion which justifies us in separating the two diseases; both frequently show initial gastro-intestinal disturbances, oedema, cardiac excitation, liability to heart failure and prolonged convalescence.

The chief points of difference are:—

(1) Beriberi occurs chiefly among persons who have eaten overmilled rice, while epidemic dropsy usually affects people who have eaten parboiled and undermilled rice.

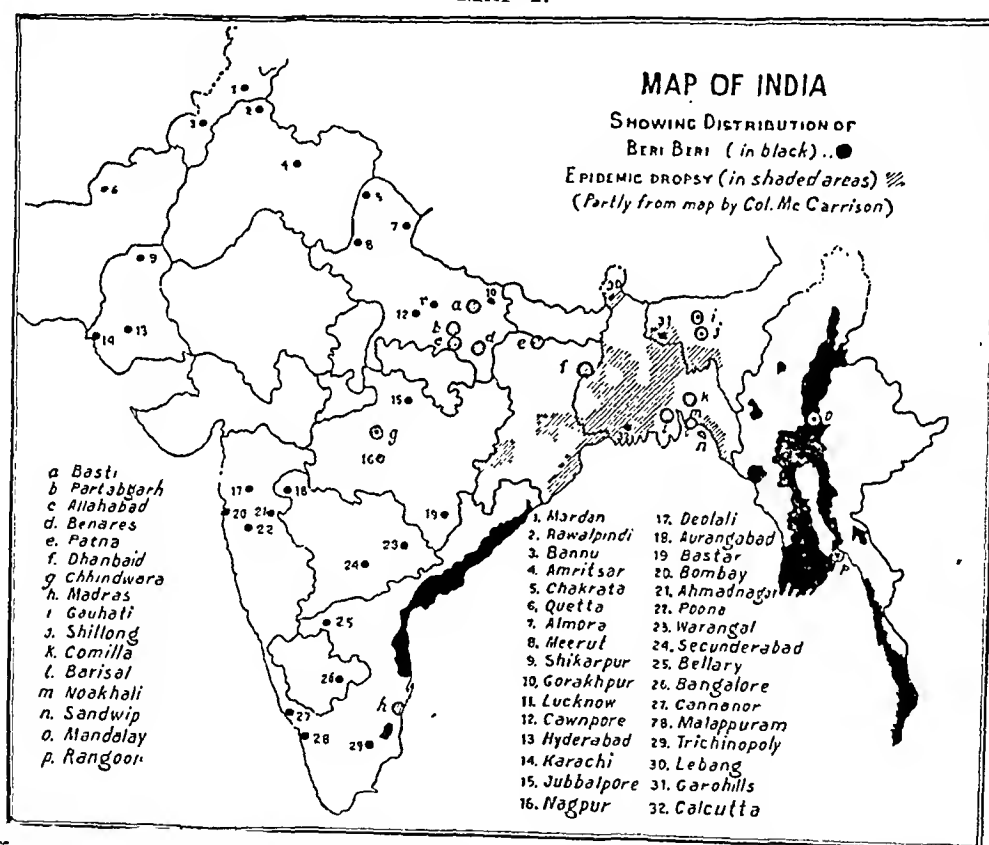
(2) Gastro-intestinal disturbances, fever, with a diffuse vaso-motor rash are much more frequent in epidemic dropsy than in beriberi, while loss of the knee-jerks, muscular wasting and foot drop are more frequent in beriberi than in epidemic dropsy.

Dr. Mozumdar, the Health Officer of Calcutta, has seen a few cases which he believes to have been examples of infantile epidemic dropsy, but the disease must be extremely rare, if it occurs at all.

We have not yet found any clinician or research worker who has been able to supply a criterion by which the average case of moist beriberi can be distinguished from a typical case of epidemic dropsy: it is pretty certain that a case which would be called moist beriberi in the Far East would be called epidemic dropsy in Calcutta and vice versa.

Broad clinical differences do exist between the two disease groups and it is necessary to try to discover the reasons for these: they may be due

MAP I.



These differences are of degree rather than of kind, and the only two points in which real differences exist between the diseases are the frequent occurrence of glaucoma in the later states of epidemic dropsy and the complete absence of infantile forms of the disease, whereas infantile beriberi is well known in some parts of the Far East.

It would be interesting to know if the ophthalmic surgeons of the East do not come across more cases of glaucoma after outbreaks of beriberi. Le Dantec describes dimness of vision and scintillation as a symptom of some cases of beriberi.

With regard to infantile beriberi this has not been reported from India or Burma so far as we are aware, so that the absence of infantile epidemic dropsy does not form satisfactory evidence by which to differentiate between the diseases.

to variations in the composition of the poison which we believe to be the cause of both diseases. Such variations may result from the action of different micro-organisms, or more probably from the action of the same organisms on different types of culture media—polished rice in one case and parboiled rice in the other. Until there is some satisfactory means of distinguishing between the two diseases it is better to class them together provisionally in one disease group. The following speculative classification of the beriberi-like diseases is modified from that given in a paper submitted to the 1923 meeting of the Far Eastern Association of Tropical Medicine.

It is very interesting to note the great variety of opinions which have been expressed on the causation of epidemic dropsy.

Most of these are based on the observation of single outbreaks of the disease.

THE SYMPTOMS OF EPIDEMIC DROPSY.

The following table shows the percentage frequency of some of the chief symptoms of epidemic dropsy as recorded by various observers.

	Cobb (Barisal Jail, 1903).	Ball (Sylhet Jail, 1906).	Greig (Basti Jail, 1907).	Anderson (Comilla Jail, 1908).	Daley (Alipore Refrac- tory, 1908).	Campbell (Dacca Asylum, 1908).	Greig (Calcutta outbreak, 1910).	Megaw and others (Cal- cutta and Allahabad) including the reports of Banerji, Bhattacharji and Paul (1909-1927).
Fever	87	..	..	..	26	40	51	30-50
Gastro-intestinal dis- turbance.	87	100	..	..	18	20	60	26-81
Edema	100	100	100	100	100	100	98½	92-100
Absence of knee-jerks	..	..	55½	..	34	4	3½	13-61
Increased knee-jerks ..	..	..	..	..	10	8	7	26-72
Tenderness of calf muscles.	78	70	..	..	..	5	31½	25-63
Patchy erythema of legs, etc.	..	..	..	..	..	4	28½	10-25
Tendency to hæmor- rhages.	..	..	..	..	..	..	8	2-4
Palpitation .. ..	..	74	6½	..	100	24	16	30-90
Dyspnoea .. ..	..	..	..	..	6	..	7	33-69
Cardiac systolic bruit	..	19½	12½	..	6	2½	..	6-39
Cardiac dilatation ..	..	..	..	9	6	18	..	9-30

Infection and rice-intoxication are the most popular views and Lt.-Col. Greig is the only writer who favours the dietetic deficiency to the exclusion of other theories.

Various Theories as to the Ætiology of Epidemic Dropsy.

1. *Place Infection:* Remarks.
Dr. C. Barry, *I.M.G.*, 1900-01. Also nitrogen deficiency.
Major Hall, *I.M.G.*, 1906. Organisms in floor of infected building.
2. *Infection spread from person to person (by contact of food).*
Col. McLeod, *I.M.G.*, 1877-80.
1893-94.
Capt. Rogers, *I.M.G.*, 1902.
Col. Cobb, *I.M.G.*, 1903. "Intestinal infection."
Daley, *I.M.G.*, 1908. "More or less communicable."
Anderson, *I.M.G.*, 1908. Controlled by segregation.
Dr. H. N. Ghosh, *Cal. Med. Jour.*, 1910. Infection of rice.
Lyngdoh, *I.M.G.*, 1912.
Capt. McCombie Young, *I.M.G.*, 1912. Food contamination.
Drs. B. K. Bhowmik and S. L. Sarkar, *Ind. Journ. of Med. Res.*, 1921 and 1922.
Dr. B. B. Brahmachari, *Cal. Med. Jour.*, 1927.
Anderson, *I.M.G.*, 1927. Evidence of person-to-person communication.

3. *Insect-borne Hypothesis (infection by a microbe through an intermediate host).*

- Heaney, *I.M.G.*, 1905. Insect-borne protozoan.
Dr. A. Pal, *I.M.G.*, 1907. Mosquito-borne.
Capt. Delany, *I.M.G.*, 1908. Bacterial infection transmitted by bed-bug.

4. *Deficiency in Food (nitrogen, phosphorus, etc.).*

- C. Barry, *I.M.G.*, 1900-01. Also infection.
Major Greig, *Scientific Memoirs*, 1910. One-sided dietary.
Major Greig and Major Kennedy, *I.M.G.*, 1916. Inferior diet.

5. *Mustard Oil Poisoning Theory.*

- Dr. S. N. Sen, *Cal. Med. Jour.*, 1909 and 1911. Adulteration with mineral oil.
Dr. Sagayam, *I.M.G.*, 1927.

6. *Due to Intoxication by Rice.*

- Campbell, *I.M.G.*, 1908. Rice or fish poisoning; most probably rice.
Munro, *I.M.G.*, 1908. Food-poisoning; possibly diseased rice.
Capt. Megaw, *I.M.G.*, 1910. Poison in stored rice.
Major Acton, *I.M.G.*, 1921.
Lt.-Col. Megaw and Dr. Banerji, *I.M.G.*, 1923.
Lt.-Col. Megaw and Dr. Bhattacharji, *I.M.G.*, 1924.
Maj. Acton and Maj. Chopra, *I.M.G.*, 1925.
Maj. Hingston, *I.M.G.*, 1926.

Lt.-Col. Acton and Maj. Chopra, *I.M.G.*, 1927.
Drs. S. L. Sarkar and B. M. Gupta, *I.M.G.*, 1927.

7. *Toxi-Infection.*

Capt. Rost, *I.M.G.*, 1910. Found a diplobacillus.

8. *Intestinal Sepsis.*

Col. Lukis, *I.M.G.*, 1908. Of the nature of urticaria, erythema nodosum, etc.

9. *No cause ascertained.*

Capt. Campbell, *I.M.G.*, 1904.
Rev. Crozier, *I.M.G.*, 1905.

It will be noted that the disease manifestations are very variable in their frequency with the exception of œdema which is almost always present. In spite of the variability of the symptoms there are few diseases which are so easy of recognition by an observer who is familiar with the essential features of the disease. The figures in the last column represent my own personal experience combined with that of the various colleagues who co-operated with me in studying the outbreaks which we have encountered. The figures for small and exceptional groups of cases are not included as they would give a misleading idea of the disease.

It is necessary to emphasize the great variations which occur in the severity of the disease; some outbreaks and cases are so mild that it may be difficult to tell whether the patients really have the disease at all.

In other outbreaks the disease may be of such severity that the mortality is 50 to 75%. The remarkable outbreak, recorded by Major Hingston in the *Indian Medical Gazette* of August 1926, is an example of the excessively severe form of the disease. Out of a household of 22 persons no less than 15 died and 3 of the survivors suffered from a severe pernicious type of anæmia with retinal hæmorrhages from which they recovered. The Allahabad family outbreak, recorded by Dr. R. N. Banerji and myself in the *Indian Medical Gazette* in 1923, was the most severe of which I have had personal experience; in it several of the affected persons also had hæmorrhagic retinitis, but the mortality was low because treatment was started early.

It may be mentioned that there was no possibility of dietary deficiency in either of the above severe outbreaks; in both there was a strong presumption that the disease originated from a special sample of highly toxic rice.

A striking fact is that when the disease is recognized early and proper treatment instituted the patients make a rapid recovery. The essential points in the treatment are to cut rice out of the diet and to supply suitable food rich in easily assimilable animal proteins, fresh milk being the most valuable source of these. The supply of vitamins is also important, but not more so than in the case of other diseases in which damage to the nerves has occurred.

PART II.

RECENT OUTBREAKS OF EPIDEMIC DROPSY
IN BENGAL.

This part of the paper deals with a number of small outbreaks observed in Bengal in 1925 to 1927, including the great outbreak of 1926. Most of the observations were made by the two junior authors under the general direction of the senior. The chief features of these outbreaks are shown in the tables and charts, but a few explanatory remarks are necessary.

OUTBREAKS IN BALLYGUNGE (CALCUTTA) IN JULY AND AUGUST 1925.

(a). *United Mission Girls' School.*

This outbreak occurred in a school for Indian girls: 14 out of 50 girls were attacked, all were eating the same food which was the usual Bengal diet. At an early stage rice was excluded from the diet and rapid improvement followed: then the Lady Superintendent, believing that mustard oil was the cause of the disease, allowed the girls to return to a rice diet for a week but excluded mustard oil. After a few days the symptoms became aggravated and rice was stopped; rapid convalescence then followed.

It is interesting to note that a boy from the neighbouring Bishop's College was attacked at the same time as the girls: it was found that his food had been supplied by his sister from the girls' school. He was the only person in the college who had the disease. The cases were mild, there was no diarrhœa and no fever, all had palpitation and œdema, the knee-jerks were lost in 4 out of 14, increased in 7 out of 14, and normal in 3.

Enquiries into the diet brought to light the fact that eight maunds (640 lbs.) of rice had been bought in the middle of June: the first case occurred a month later. About 3 maunds of rice remained when the disease appeared, and an attempt was made by us to secure this rice for examination; the mistress of the school entrusted it to the dealer from whom it had been bought for the purpose of having it weighed; but the dealer evidently feared that he might get into trouble and disposed of the rice so that we failed to get possession of it. This outbreak is of considerable importance as all the statements made by the Superintendent of the school can be relied on implicitly.

(b). *Ahiripukur Outbreak (Map II).*

This occurred almost entirely among persons of the labouring classes who lived near the United Mission Girls' School. There were 56 cases and the affected families with only two exceptions bought rice which came from the same store from which rice was supplied to the girls' school. One man who lived at a distance, bought his rice from this store and got the disease. No other cases were discovered in this immediate locality.

Forty-one cases were personally investigated by the junior writers, of these 2 had fever, 3 had diarrhœa, 36 had palpitation, the knee-jerks were

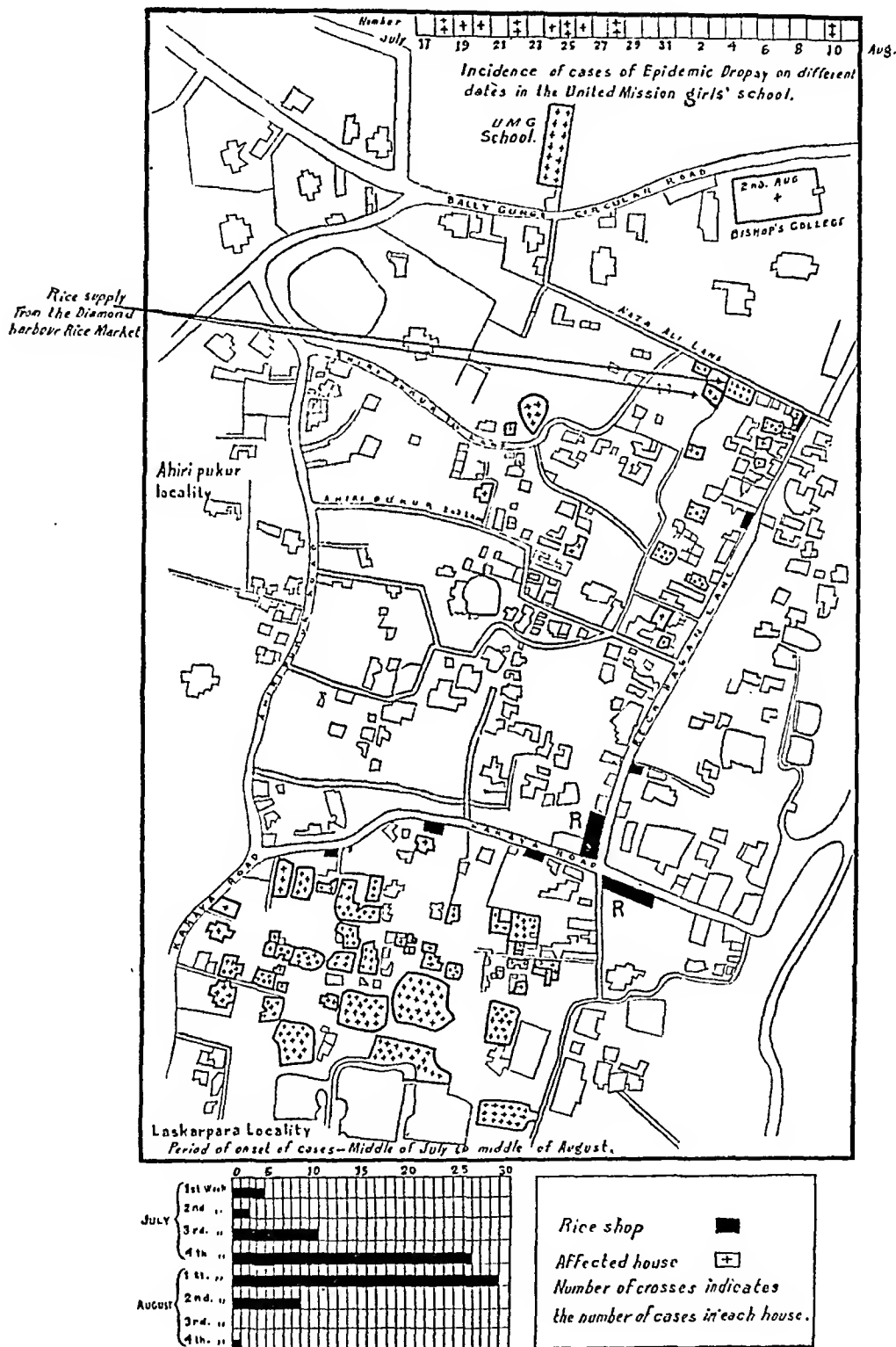
lost in 15, exaggerated in 18, and normal or diminished in the rest. During the investigations we had reports of 4 deaths.

(c). *Laskarpara Outbreak (Map II).*

This was a large outbreak occurring in a locality near the above two. The patients

MAP II.

Epidemic Dropsy in Calcutta, 1925.



Incidence of Cases in the Ahiripukur Locality.

The rice supply to all the affected families came from the Tollygunge Rice Mills being originally stocked in the two big rice godowns marked R, from which the smaller rice shops got their supply, with the exception of two families who got their rice from a different place.

belonged to the working classes, and about 500 persons were attacked; these made up about 75 per cent. of the population of the locality. Rice was bought from six small shops, all of which obtained their supply from the same two stores from which rice was supplied to the persons affected in outbreaks (a) and (b). The rice was originally obtained from rice mills in Tollygunge. There were at least six deaths. These cases could not be investigated in detail as we did not visit the locality till the epidemic had nearly subsided. The rice had been stored in the shops for one or two months as a rule after receipt from the mills, but some had been kept for 10 months after manufacture, this being the residue of a consignment which was not fully sold out. It was not possible to trace the source of the rice which was presumably responsible; it was likely to have come from the same original stock as the rice in use by the persons affected in outbreaks (a) and (b) as these stores were close to the affected locality and the disease occurred at the same time.

OTHER SMALL OUTBREAKS IN 1925.

From the whole of the rest of Calcutta only three small family outbreaks were reported for 1925, but it is probable that others may have occurred. In one family two of seven persons were attacked, in another two out of three, and in the third all three members had the disease.

In each of these attacks, the symptoms appeared about three weeks to a month after a particular supply of rice had been taken into use.

OUTBREAKS OUTSIDE CALCUTTA IN 1925.

1. Bosepukur Outbreak.

In July and August 1925, there was an outbreak affecting 7 persons in a small village called Bosepukur; this is of special interest, as it was one of the very rare examples of occurrence of the disease among villagers who store their own rice in the form of paddy and prepare it for themselves in quantities sufficient for 10 to 14 days' requirements. The paddy had been stored for six months in a granary with mud-covered bamboo walls, and a thatched roof. The floor was raised two feet from the ground on posts. The granary was situated in a damp place and the conditions of storage were exceptionally unsatisfactory.

2. Jessore Outbreak.—September and October 1925 (Map III).

This also is an example of the rare outbreaks in which rice made from home-stored paddy was being used. There were 46 cases, of which 16 were in middle class persons who were eating old rice and 30 were in cultivators who were eating rice which had been recently prepared from their own paddy which had been harvested in July. The outbreak ceased suddenly after the harvesting of the new crop in the second week of October. The chief symptoms in these 46 patients were—fever in 35, palpitation in 34, diarrhoea in 24, loss of the knee-jerks in 17, exaggeration of the knee-jerks in 19. A diffuse

patchy redness of the skin was seen in 9, oedema of varying degree was present in all.

The Bosepukur and Jessore outbreaks are the first in which there has been satisfactory evidence that the disease can occur among persons who store their own paddy and prepare the rice in small quantities. When we consider the large number of cases of epidemic dropsy which have been reported among the eaters of parboiled rice which has been stored for several weeks or months, and the extreme rarity of its occurrence among the millions of rice-eating cultivators of Bengal, it is evident that the time-honoured village methods of storage and manufacture of rice constitute a valuable protection against the disease. Until these two outbreaks were discovered, it seemed likely that paddy was entirely exempt from the changes which are associated with the occurrence of the disease. As a practical working rule we may still regard the risk of eating freshly prepared rice as almost negligible, but it is obviously desirable to recommend care in the storage of paddy as well as in the case of manufactured rice.

It is quite possible that a few unreported cases of epidemic dropsy may occur from time to time among cultivators who store their supplies of rice in the form of paddy but the disease is now so well known in Bengal that it is impossible to believe that it occurs to any appreciable extent without being reported.

THE CALCUTTA OUTBREAK OF 1926.

This is the largest outbreak on record, it caused many deaths (*see* Charts 1, 3 and 4).

In a previous article the senior writer expressed the hope that the establishment of large numbers of rice mills near Calcutta would result in a shortening of the dangerous period of storage of manufactured rice and so protect the city from the disease.

Till 1926, there were good grounds for believing that this hope was justified as the disease rarely attacked the people of Calcutta who used rice from the local rice mills, and the only considerable outbreak since 1909, was that which occurred in 1918-19, in Howrah* where rice from the country districts was used to a great extent: this rice had been manufactured at distant places and was imported by rail, road or country boats and so was exposed to damp during transit or storage.

It was, therefore, disappointing to find that the new conditions of storage and manufacture of the rice in Calcutta failed in 1926 to protect the population from the disease. In previous outbreaks it had invariably been found that the rice which was in use had been stored under conditions in which it was exposed to damp, heat, and lack of ventilation, so that it was natural to seek for similar conditions in this case.

The meteorological reports show that May and June were exceptionally hot in 1926. On the

* Howrah is really the part of Calcutta which is separated from the rest of the city by the river Hooghly.

18th of May at 4 p.m. there was a sudden and unexpected storm with 1.3 inches of rain; this thoroughly wetted large quantities of rice which was being dried in the sun after parboiling. On the 17th of June there was another heavy shower of rain (3.3 inches) which soaked large quantities of rice. Then there followed a period of very sultry weather till the 22nd of July, when very heavy though belated rain came and caused extensive flooding so that the people in many places had to move about on boats or rafts (see Chart 1).

The outbreak appeared rather suddenly towards the end of June: it was shorter and sharper than the previous great outbreak of 1909-1910, but

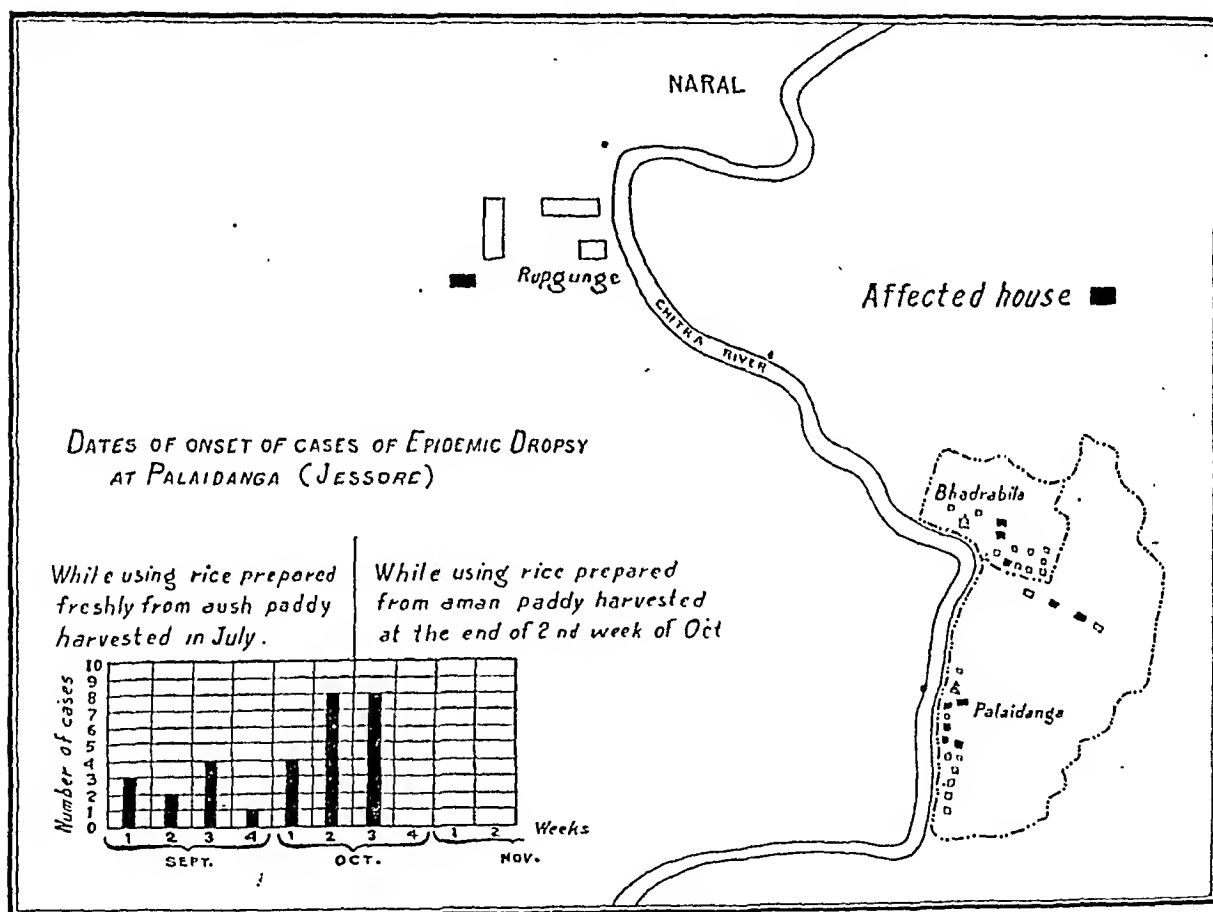
which the causal factors were at work. It is impossible to form any accurate estimate of the number of cases, but there must have been at least 6,000. More than 1,500 cases were investigated by the junior writers, Dr. S. P. Bhattacharji and Dr. B. K. Paul; these cases are believed to form an accurate index of the whole outbreak.

It is probable that large numbers of other persons suffered from mild and unrecognized forms of the disease. The chief features of the outbreak were as follows.

Only rice eaters were affected, no Europeans were attacked, Sikhs (who eat a little rice, brought from up-country) also escaped entirely, Marwaris were attacked rarely and only when they

MAP III.

Outbreak of Epidemic Dropsy in Jessore in 1925.



occurred at the same season (Charts 1, 2, 3, 4 and 5). The explosiveness of the outbreak is more evident if the separate localities are considered, as in each place the great majority of the attacks began within a period of about a fortnight.

The whole outbreak may be regarded as a prolonged storm of widespread distribution, made up of a large number of local outbursts most of which occurred rather suddenly and explosively. It is to the date of onset that attention should be specially directed, as the illness may be prolonged and death may result several weeks after the first appearance of symptoms; hence the dates of deaths are of little value in showing the time at

had adopted the habit of rice eating. The age distribution was the same as usual, infants and very young children being almost immune. There were 94 cases in children under the age of 10 years out of a total of 1,055 investigated. Of 447 cases which were examined clinically there was cedema in all, diarrhoea at the onset in 361, fever at the onset in 68, palpitation in 424, pains in the calf muscles in 282. The knee-jerks were lost in 58, diminished in 15, normal in 50 and increased in 324, at the time of examination.

A mottled red flush of the skin of the legs was seen in 95. Dimness of vision was complained of by only 8 persons, but there were many

cases of glaucoma in the later stages of the disease and after the symptoms had subsided. The recorded deaths for the whole of Calcutta were 1,165, the probable mortality was about 25 per cent. In some localities the death-rate was much higher than in others.

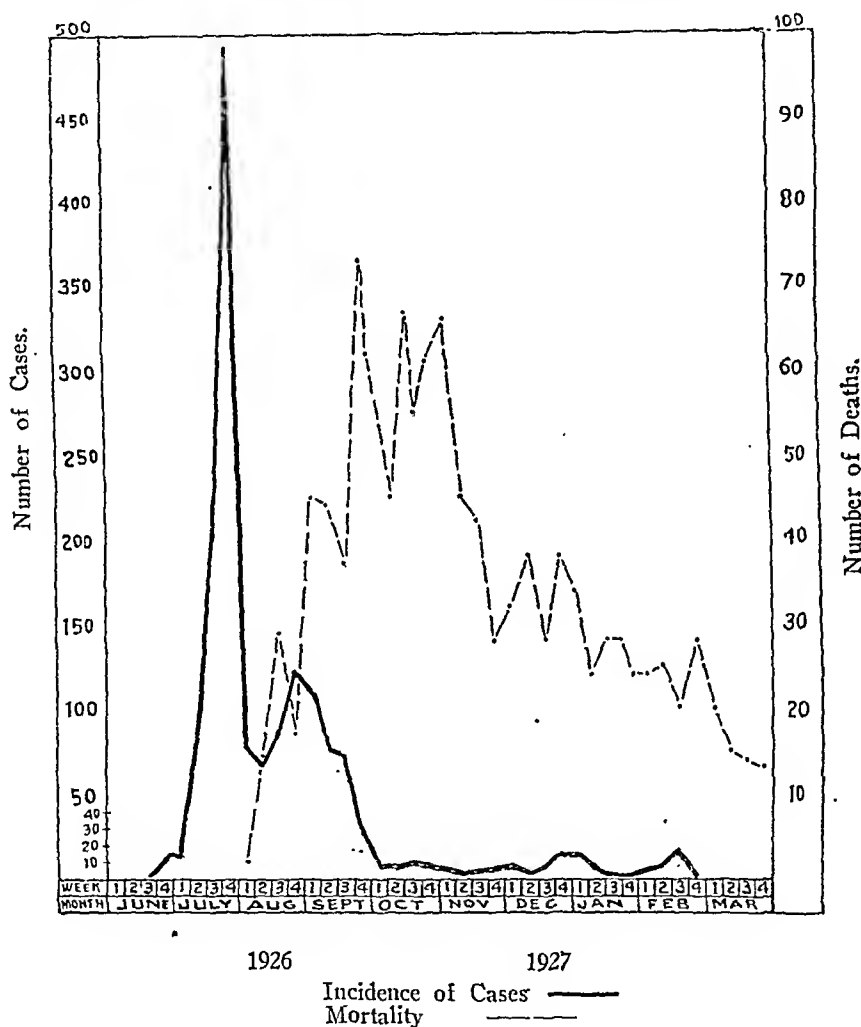
Many relapses were reported, in a few cases relapses were said to have taken place in persons who continued to abstain from rice. Such an occurrence has never been noticed among patients who were under proper control in hospitals and it is a well-known fact that Bengali

tract when rice of any kind constitutes part of the diet, and not otherwise.

The average diet of the victims consisted of, rice 12 to 16 oz., *dal* (leguminous grains) 1 to 2 oz., *ata* (wheat flour) 2 to 4 oz., fresh fish 1 to 2 oz.; green vegetables 6 to 8 oz., mustard oil was used by all. Many of the well-to-do patients also took eggs, fresh milk, meat and fresh fruit, and it was quite impossible to detect any association between a dietary defect and the occurrence of the disease. All classes of the rice eating communities were equally affected. The diets of the

CHART 1.

Incidence of Cases and Mortality in Epidemic Dropsy, 1926-27.



patients regard abstinence from rice as an intolerable hardship. It is quite common for them to continue to eat rice even when they assure their medical man that they are not doing so.

An interesting point is that a return to a rice diet may be followed by a return of the symptoms even when a different kind of rice is eaten. The senior writer has no personal experience of this as he invariably prohibits rice of any kind, but several cases have been reported which appear to be well authenticated in which this has happened. The occurrence of cases suggests the possibility that the causal agency sometimes continues to be formed in the gastro-intestinal

affected persons were of the same kind as they had been eating before the disease appeared, and those who were living on a liberal and varied diet were attacked just as frequently as the poorer people whose diet was less satisfactory. The year 1926 was not one of any special scarcity of food or of economic depression, and there was no association with increased cost of rice such as was reported by Colonel Greig in 1909 (Chart 6). The rice was the usual parboiled variety, most of it came from the rice mills in the outskirts of Calcutta. Some details of the diet scales of the affected persons are given later in this paper.

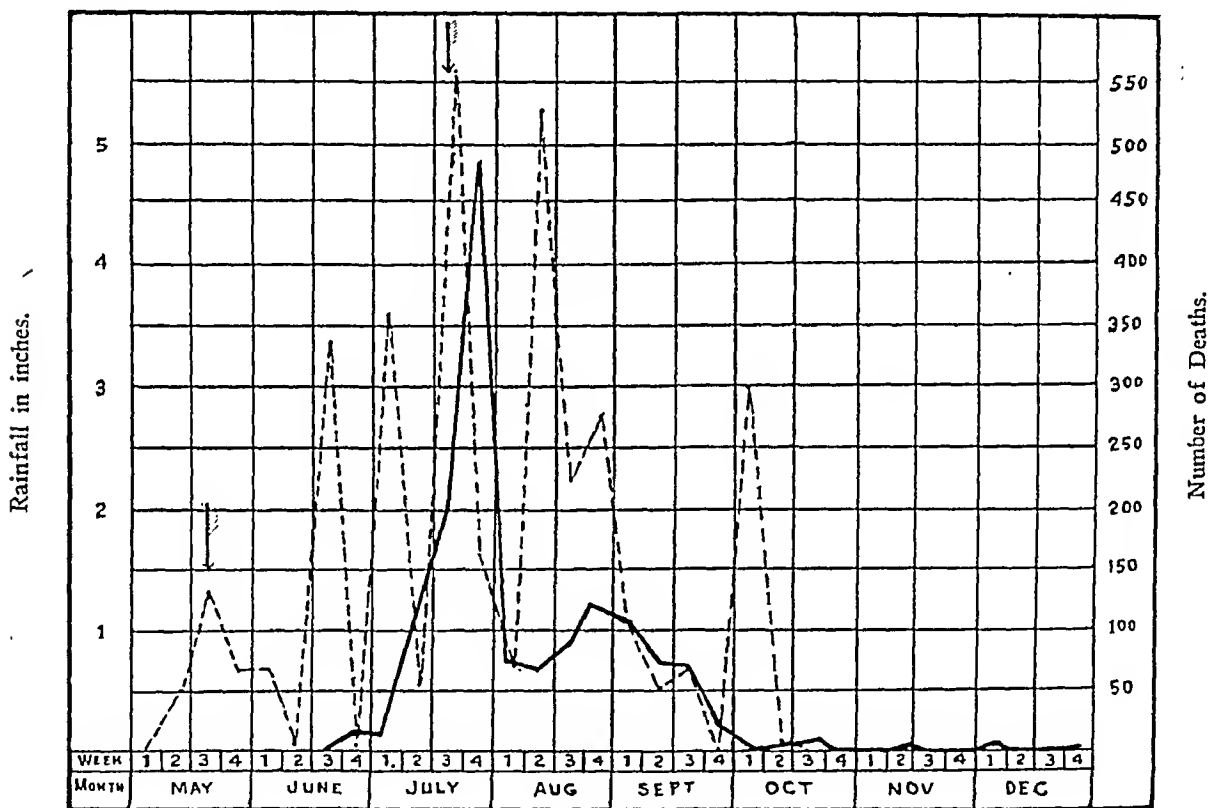
As reported already by Col. Aeton it was observed by Dr. Bhattacharji and Dr. Paul that a good deal of rice was badly wetted by unexpected downpours of rain during the normally dry season in May. It would obviously be difficult to get the rice properly dried after this wetting, and, during the days following on the heavy rain, the air was hot and moist, so that the conditions were exceptionally favourable for microbic and fermentative changes to occur in the stored manufactured rice. Samples of rice which were being eaten at the time were found to be affected by the "white disease," which Col. Aeton regards

(a) In one diabetic patient the knee-jerks were found to be absent and there was slight œdema over the tibiæ. On these grounds the diagnosis of epidemic dropsy was made. The absence of the knee-jerks is very common in diabetics and in this case it was found that œdema had previously occurred from time to time.

(b) Two persons who were convalescent from typhoid fever were suspected of suffering from the disease; in both of these there was only a slight œdema of the feet and ankles such as would often be found in convalescents from a severe disease.

CHART 2.

Showing the Relationship between the Rainfall and the Incidence of Epidemic Dropsy in Calcutta, 1926.



On the 18th May a violent rainstorm occurred about 4 p.m. There was practically no warning of this and much of the rice in the factories was being dried when the storm came and thoroughly wetted all the rice which was exposed.

On the 22nd July there was a very heavy shower and all Calcutta was flooded, the water entering inside many rice-godowns.

as being associated with the occurrence of epidemic dropsy.

I am not convinced that this association is constant, but it is quite certain that the "white disease" is a clear indication that microbic action has taken place and therefore rice which shows signs of this disease should always be regarded with suspicion, as the grain must have been exposed to conditions under which toxic substances are likely to be formed.

Reports were received from time to time of the occurrence of the disease in persons who had not eaten rice. Every available case of this kind was investigated. The cases fell into three groups—

(c) One dyspeptic patient had slight œdema of the feet, but no other symptoms: there was no evidence that he had epidemic dropsy.

When epidemic dropsy is common, everybody is on the lookout for swelling of the feet and legs, so that puffiness of the feet and ankles is often discovered for the first time in persons who have had the condition for months without paying attention to it.

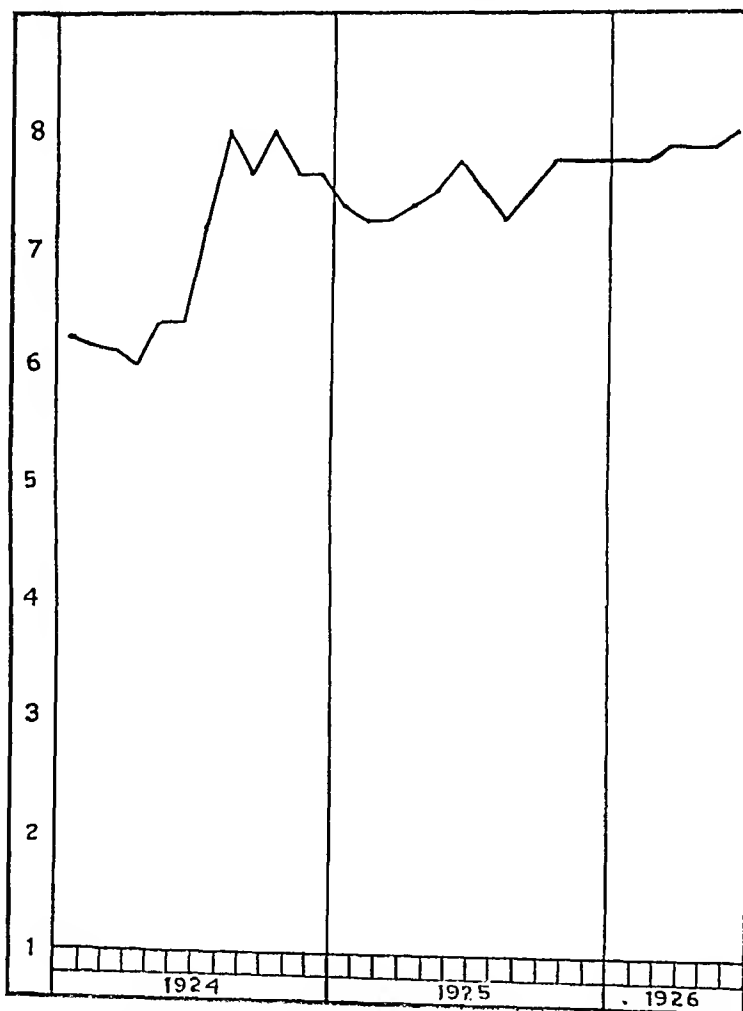
Quite recently a patient came to the hospital with swelling over the tibiæ; he had been diagnosed as a case of epidemic dropsy but the swelling was fully accounted for by the chronic parenchymatous nephritis from which he was found to be suffering.

AN OUTBREAK IN HOWRAH, 1926 (MAP V.)

This remarkable group of cases was investigated by the junior authors with the valuable help of the Health Officer of Howrah. The map is self explanatory: it shows a wonderfully close

association of the disease with the rice supply. The two places shown on the map were situated at a short distance from each other and it will be seen that the disease was present in nearly all the houses which were supplied from two shops, while the houses supplied from other shops entirely escaped.

CHART 3.
Average Monthly Variations in the Prices of Rice (*commoner varieties*) in Rupees per Maund.



Average Diets of the Different Classes of People (males) affected with Epidemic Dropsy.

Class or Creed.	of Article Food.	Rice.	Ala.	Dal.	Fish.	Mutton or Beef	Potatoes.	Green Vege- tables.	Ghee or Butter.	Oil.	Fruits: Man- goes, etc.	Sweets, Pud- dings, etc.	Milk.	Eggs.	Bread, Bis- cuits, etc.	Muri (Fried Rice).	Soup.	Total Pro- teins in gramme.	Total Calo- ries.
Hindu Bengalis— Rich ..	Quantity in ozs.	4	6	1	4	4	2	4	3	2	4	2	12	..	..	..	..	115.2	3,289
Middle-class ..	"	16	..	2	2	..	2	6	1	1	4	1	6	..	..	..	..	72.4	2,837
Poor ..	"	22	..	2	1	..	1	6	..	1	2	..	..	..	..	1½	..	66.1	3,066
Muhammadans— (Poorer classes)	"	8	8	1	1	2	2	4	..	1	2	..	..	..	2	..	..	76.2	2,425
Indian Christians	"	16	..	1	2	2	2	4	½	1	2	..	..	1	2	..	..	67.2	2,780
Anglo-Indians ..	"	1½	..	..	..	12	4	4	1	..	5	2	2	2	12	..	6	116.4	3,039

This suggests that while the disease is associated with the eating of rice, there is no strict proportion between the quantity of rice eaten and the incidence of the disease. The richer classes eat old rice while the poorer classes eat fresh rice to a preponderating extent, owing to its cheapness.

The Diets of the Persons Affected.

Dr. Bhattacharji and Dr. Paul made exhaustive enquiries into the diets which were in use by the persons who had epidemic dropsy with a view to finding whether there was any observable difference between the diets of the affected and the non-affected who belonged to the same classes of the community.

They were unable to discover any association between diet and the disease except that rice was eaten in considerable amounts by all those who were attacked. There are remarkable variations in the total quantity of rice which was

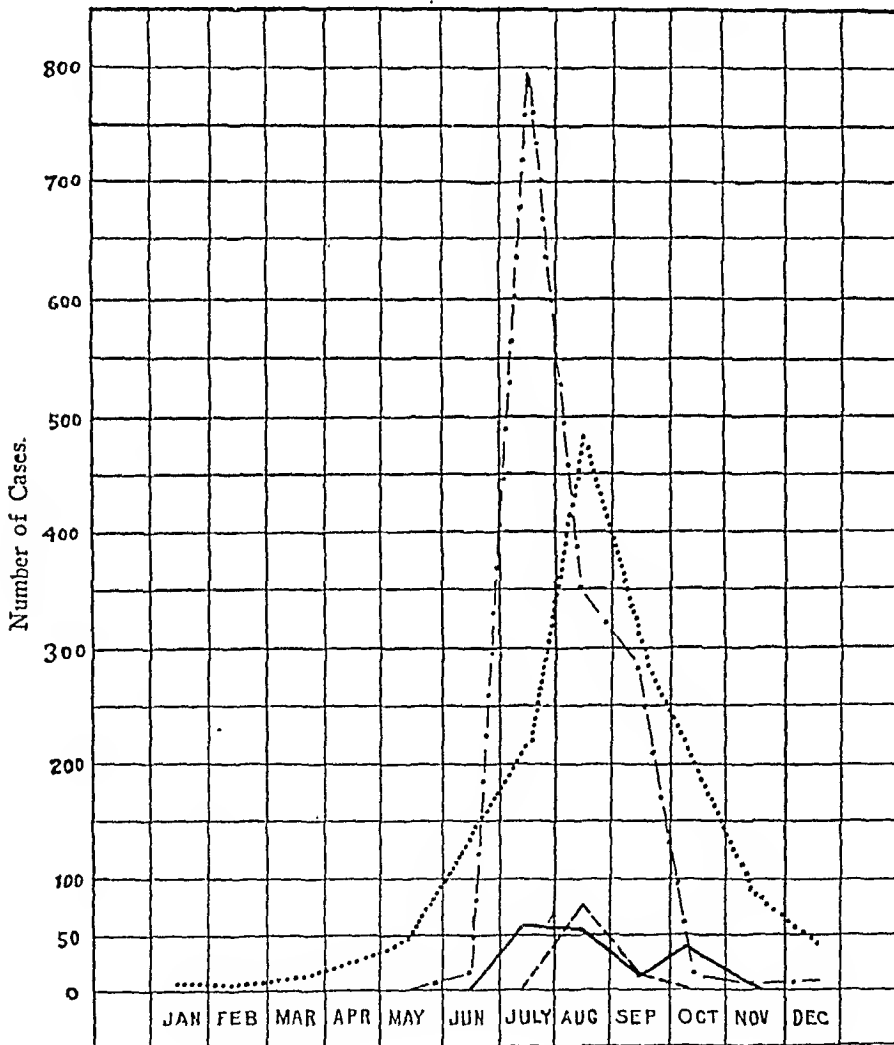
The general composition of the diets gives no support to the vitamin B deficiency view. The rice in use was parboiled undermilled rice which had been stored for varying periods after manufacture.

The table shows the average composition of the diets of the class of persons suffering from epidemic dropsy; the diets of those who escaped did not differ in any observable respect from the diets of those who were attacked.

Blood Pressure.

The junior author made careful estimates of the blood pressure at various stages of the disease

CHART 4.
Onset of Cases of Epidemic Dropsy in Calcutta.
During 1909
" 1924
" 1925
" 1926 —.—.—



consumed; for example the Muhammadans who were heavily affected eat only 8 oz. of rice daily, whereas the poorer Hindus who did not suffer any more severely consumed about 22 oz. of rice. There are reasons for believing that some samples of rice become highly toxic, hence the frequency with which the disease appears soon after the offending rice has been taken into use.

in 218 patients. The results do not justify us in making any generalization on the subject, further than that in the majority of cases there is a slight increase in the systolic pressure in the early stages of the disease while in the severe cases there is a fall in the pressure. The blood-pressure, on the whole, is not of any special significance.

Variations in the Knee-jerks.

Many observations were made on the knee-jerks at various stages of the disease. Taking all degrees of severity of the disease the findings stated in percentages were:

	In-creased.	Normal.	Feeble.	Absent.	Total number examined.
During first fortnight.	60	21	3	16	117
From 15 till 30 days.	52	17	8	23	113
From 1 to 2 months.	48	12	5	35	57
Over 2 months.	38	24	..	38	13

In a few cases knee-jerks which were absent at an early stage were found to be increased in the later stages.

SANDWIP CASES IN SEPTEMBER 1926.

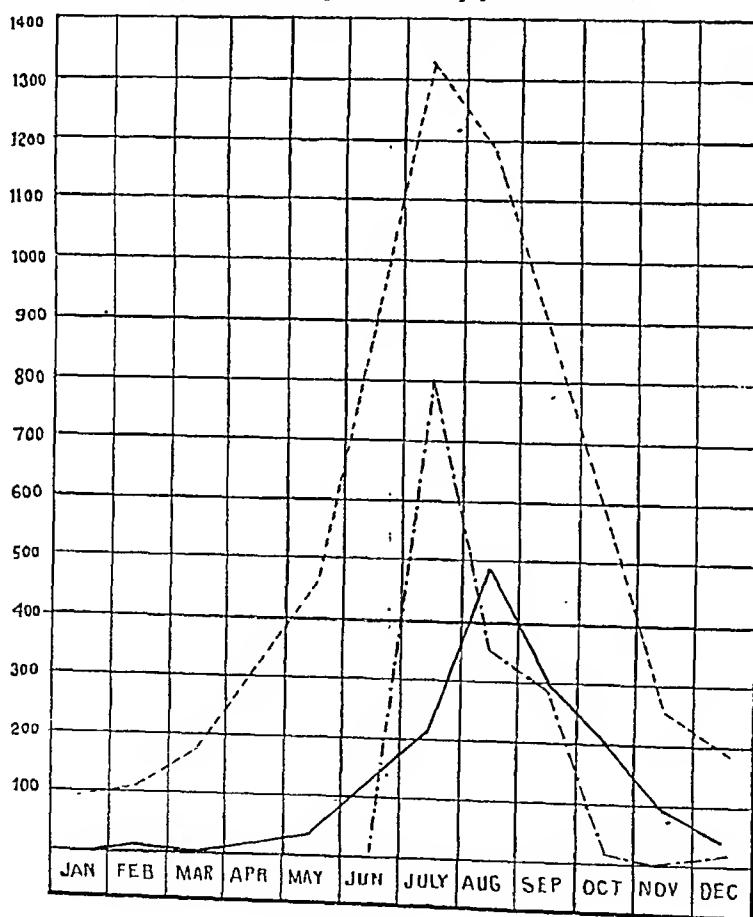
(These were investigated by Dr. Paul.)

Sandwip is an island in the Bay of Bengal about 40 miles by steamer from Chittagong; it is 150 square miles in area and has a population of 1,15,000. The Civil Surgeon, Dr. S. L. Sarkar, and the Health Officer, Dr. B. Gupta, kindly associated themselves with the enquiry into these cases and gave valuable assistance to Dr. Paul.

Forty people were attacked in the largest village, Harishpur (population about 400), only seven families were affected. The onset of the

CHART 5.

Comparative Study of the Monthly Incidence of Cases of Beriberi in Japan and Epidemic Dropsy in Calcutta.



----- Beriberi in Tokio (Mense).
 Epidemic Dropsy in Calcutta (1926).
 " " (1909).

In the later stages of the disease there is a tendency to an increase in the number of cases of loss of the knee-jerks and to a diminution in the number of cases of increase of the jerks.

In a group of 55 patients whose knee-jerks were found to be increased in the early stages of the disease, the knee-jerks were absent at some later period in no less than 25, and were diminished in 9 others.

disease was on the 26th September in the first case and on the 20th October in the last, more than half of the cases were attacked within a period of a week from the 10th till the 16th October. In this outbreak rice from several sources was used, no common source of supply could be traced; if rice-intoxication were the cause it must be assumed that several stocks of rice kept at a short distance from each other were

infected with an air-borne micro-organism which had a local distribution.

In every case the rice had been stored for a considerable time after manufacture. In Kalapania village (300 inhabitants) 2 persons in a family of 22 were attacked. The chief supply of rice in this case was home-grown, but for 15 days in July and August, Rangoon rice bought in the market at Harishpur had been used. The disease appeared 5 weeks after they had ceased to use the rice from the market. In Charani Hat village (200 inhabitants) 2 families were affected, all of the members of the 2 families used Rangoon rice from the market of Harishpur. One family consisted of 4 members; all were attacked within 2 days; another family of 6 members had 4 cases, the onset being within a period of 4 days.

The Harishpur outbreak is unusual in that no association could be traced between the use of one sample of rice and the occurrence of the disease, the other two small outbreaks were quite typical in their explosiveness, and in the apparent association with certain samples of rice which had been stored. There were no deaths.

The Sandwip inhabitants live for the most part on home-grown rice, and as usual the disease attacked only those persons who lived on rice which had been stored in the manufactured condition. Mustard oil can be excluded with reasonable certainty as no mustard oil is produced in the island, all the inhabitants use imported mustard oil from the same sources and yet the disease picked out certain families among those who consumed rice from the bazar, the other inhabitants of the island remaining free from the disease.

BOSEPUKUR CASES.

(Observed by Dr. Paul.)

In the early part of the year 1927, several cases were reported from this village (population—118).

The onset was in the first week of December 1926, and cases continued to occur till the end of January 1927. There were altogether 47 cases in a population of about 118 persons. The youngest patient was only 4 years old. There was fever at the onset in 4 cases, diarrhoea at the onset in 27 patients and later on in 5 others, the knee-jerks were lost in 4 cases, slight in 3 and increased in 35 cases.

Precordial pain was complained of by 8 and there was actual dilatation of the heart with systolic bruit in 8 patients. Pain in the calf muscles was complained of by 31, and vascular mottling of the skin of the legs was found in 16 cases. There were 3 deaths. In this locality we found very interesting evidence pointing to the fact that the cases were exclusively confined to the 12 families which used bazar rice from one shop in the village. An apparent exception was in the case of one family of 7 persons in which

3 cases occurred, this family used home-grown rice but they frequently took meals with the affected families. The shop-keeper and his family who were using the same bazar rice but living at a place nearly $1\frac{1}{2}$ miles distant from this place were affected, whereas the other people who lived in his neighbourhood escaped entirely. The members of 5 families in the same village who used rice prepared from their home-grown paddy or rice from other sources all escaped, with the exception of the three persons referred to above; and these had also eaten the rice which is presumed to have been responsible for the outbreak.

Cases of Epidemic Dropsy in Calcutta in 1927.

In Akhil Mistry lane and Kanai Dhar lane in the vicinity of Mirzapore Street—the houses were from 10 to 50 yards apart.

Four households were affected; there were 26 cases; the onset was during the last three weeks of February. The rice used by three of the families was from three different shops; in the fourth family the source could not be traced as the family had left Calcutta. The patients were middle-class Bengalis living in masonry houses and there was no evidence of any intercourse between any two of the families which were affected. In one house all the 11 members of the family were attacked; in another 4 out of 6; in another 6 out of 8; and in the fourth 5 out of 7. There was one death. Most of the cases were of moderate severity.

CASES OF RELAPSE IN 1927.

No cases of epidemic dropsy were reported during the months of March and April 1927, but from May till August, 21 cases of relapse were brought to our notice. Three members of one family relapsed in July 1927 after being free from symptoms for 9 months but in all of the other 18 cases only one person in each of the previously affected families was attacked, the other members of these 18 families remained free from symptoms. Contrary to what usually happens in outbreaks of the disease, there was no evidence whatever of a common supply of rice being responsible for these relapse cases.

The interval of freedom from symptoms since the original attack varied from 7 to 13 months. The symptoms of the disease were the same as usual, e.g., fever in 7, diarrhoea in 12, oedema in all the 21, palpitation in 19, pain in the calf muscles in 18, knee-jerks absent in 3, diminished in 3, normal in 5, and increased in 10. There was one death.

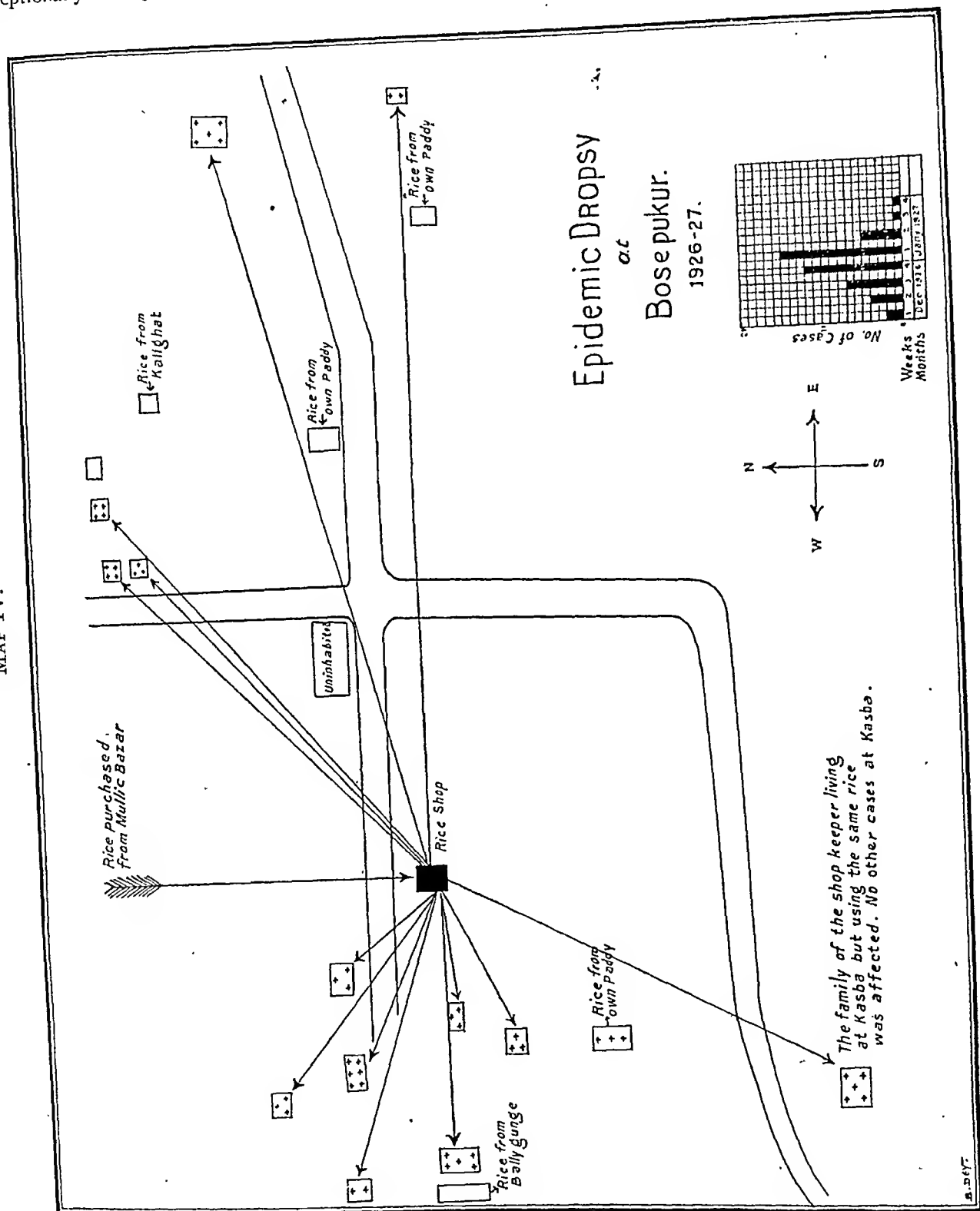
The cause of the relapses is not clear. The circumstances under which these relapses occurred rather tend to support the view that a toxi-infection existed in these cases, whereas the great majority of outbreaks are best explained as being caused by a poison which had been previously formed in the rice.

It is possible, as has been stated in previous papers, that both intoxication and toxi-infection may occur; the data as a whole support the view

that intoxication is the usual factor, toxi-infection being exceptional if it really occurs. It is also possible that the persons who relapsed were exceptionally susceptible to a poison which may

But for the fact that the disease shows so complete a failure to spread by person-to-person communication in places outside the endemic zone it would be natural to assume that these

MAP IV.



FRESH OUTBREAK IN 1927.

A family outbreak occurred in Garden Reach (Calcutta), in July 1927. All five members of a middle-class Hindu family were attacked within five days. This family had escaped the disease during the 1926 outbreak, although they got their rice from the same shop as their neighbours, about 80 per cent. of whom were attacked. The rice supply was from a neighbouring shop. The diet was in no way different from that which is in common use in middle-class Bengali families. This small family outbreak might be regarded as indicating that the persons who were attacked had escaped the "infection" in the previous year and so had not acquired immunity, but this hypothesis would be directly opposed to the great mass of evidence which is derived from a study of the numerous outbreaks.

HOWRAH CASES IN AUGUST 1927.

(Investigated by Dr. Paul in association with the Health Officer of Howrah, Dr. S. N. Mullick.)

These are of interest as they lend support to the hypothesis of mustard oil intoxication, though they can also be accounted for by rice-intoxication.

(1) A patient who came from a locality in which no other cases occurred was found to have taken his meals at a mess in a mustard oil factory. Five out of eleven persons who fed at this mess were said to be attacked, and it was found that several members of the family of the owner of the oil mill had gone to Calcutta to be treated for dropsy. Further details could not be secured.

(2) Seven families in a lane in the north quarter of Howrah were attacked during the third and fourth weeks of August. They suffered from the usually observed symptoms of epidemic dropsy. 21 cases occurred in 7 families living on the usual diet of middle-class Bengalis. Various kinds of rice were in use, coming from three separate shops; many other persons getting rice from the same shops escaped. All the victims were said to have obtained their mustard oil from one oil factory, and several of the affected persons stated that 5 to 6 days after using a certain sample of oil they suffered from diarrhoea and oedema and later on palpitation occurred. An equal number of other persons using oil from the same source escaped. No evidence could be obtained as to the existence of any adulterants of the oil. The owner of the mill asserted that the other seeds which are suspected of being used as adulterants are quite as expensive as mustard seeds, and that therefore there could be no motive for adulteration of this kind.

The possibility of some accidental and undetected adulteration of the mustard oil with poisonous seeds has to be considered, and if these two outbreaks were the only ones on record there would be good reason for thinking that accidental poisoning by contaminated mustard oil was the cause of epidemic dropsy. The question of mustard oil poisoning will be discussed later.

ENTALLY OUTBREAK IN 1927 (MAP VI.)

This outbreak began on the 2nd of August and lasted till the third week of September.

It was possible to obtain detailed information of the behaviour of the outbreak so that it is reported more fully than most of the others.

The persons affected were (1) middle-class Hindu Bengalis living in good masonry houses, (2) working-class Hindu and Muhammadan Bengalis living in huts, (3) Indian Christians.

Two infants were attacked, one was 7 months old, the other 9 months old; both lived in the same house, both had been given rice occasionally. No infant which was entirely breast-fed was attacked, although several mothers who were suckling their babies were badly affected. The rice supply of all the affected persons came from two rice shops, both of which obtained their rice from Beliaghata rice market. About 90 per cent. of all the persons who used rice from these shops were attacked. None of the twelve persons in two families living in this locality who obtained their rice from other sources was attacked. Several varieties of country (parboiled) rice were used by the affected families. The shops kept small stocks enough for two or three weeks' consumption, the supplies came chiefly from the Beliaghata rice market.

Although several varieties of rice were used it is quite possible and even likely that a certain amount of rice from one common source may have been used in making the "blends" of rice which are sold at varying prices to suit the pockets of the consumers.

It is also conceivable that several samples of rice in the shop may have become infected accidentally at the same time by micro-organisms distributed by the air, and that the conditions of storage were specially favourable to the activity of the chance infection. Mustard oil cannot be excluded with certainty as it is likely that the people bought their mustard oil from the same shops as their rice.

Some of the chief features of this outbreak are as follows:—The houses investigated were 59 with a total population of 332: of these 297 were attacked, males and females in about equal proportion.

The age distribution was—

Under	10	years	51
11	to	20	" 58
21	to	30	" 70
31	to	40	" 73
41	years and over		45

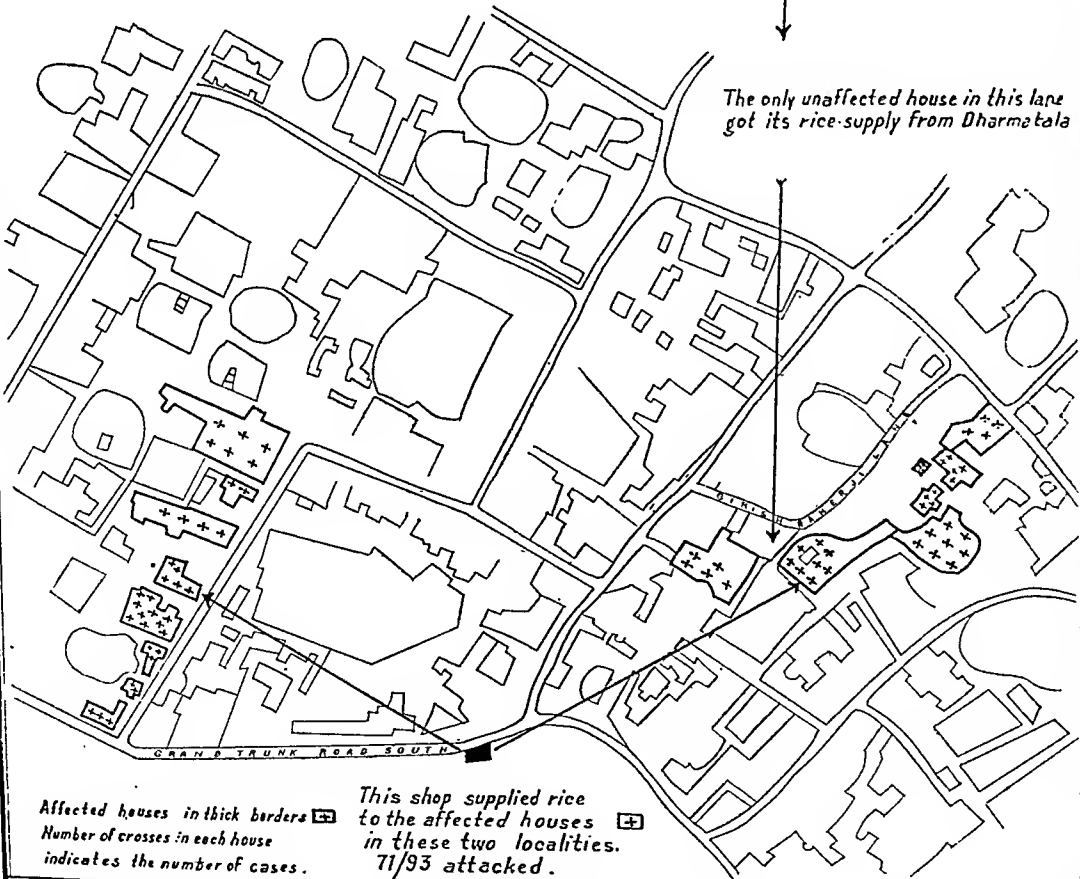
There was thus an exceptionally high incidence in young children. The clinical features of the disease were those usually seen. Out of 297 patients all suffered from oedema, 96 per cent. from palpitation, 81 per cent. from diarrhoea at the onset while only 25 per cent. had diarrhoea at the later stages. At the onset 25 per cent. had fever, while at the later stages about 46 per cent. had fever. The knee-jerks at the time of examination were—absent in 17 per cent., diminished

EPIDEMIC DROPSY IN HOWRAH . Onset during 3rd. & 4th. weeks of July 1926 all cases broke out within 10 to 12 days .

About 150 people living in the same area
bought their rice from this shop at Dharmatala
None of these were affected

About 100 people bought their
rice from this shop,
of these only Six escaped
all the others were
affected

The only unaffected house in this lane
got its rice-supply from Dharmatala

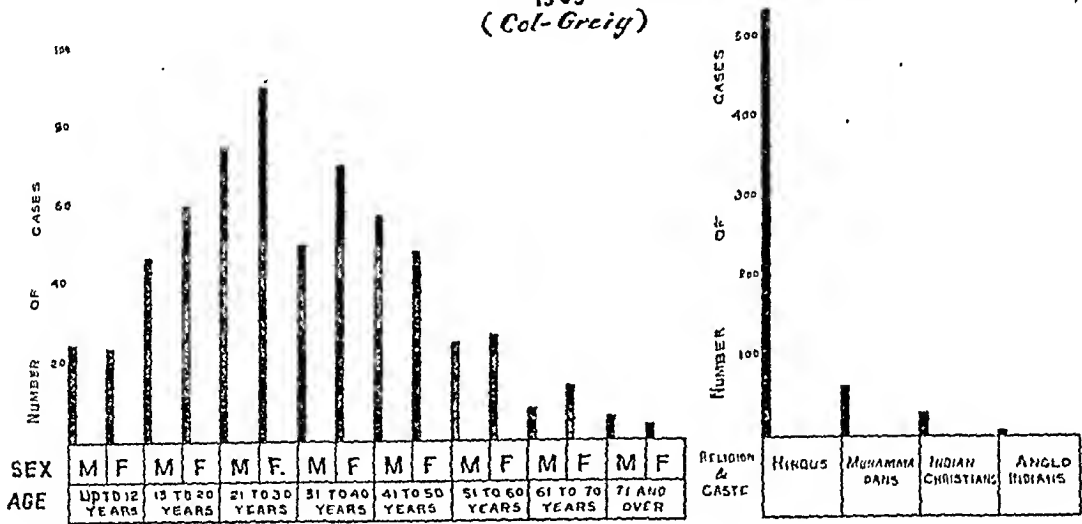


Affected houses in thick borders
Number of crosses in each house
indicates the number of cases.

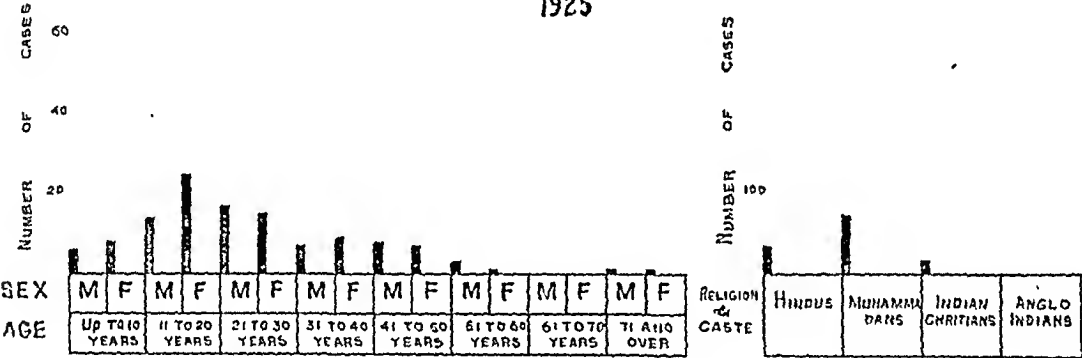
This shop supplied rice
to the affected houses
in these two localities.
71/93 attacked.

CHART 6.
Incidence of Epidemic Dropsy Cases.

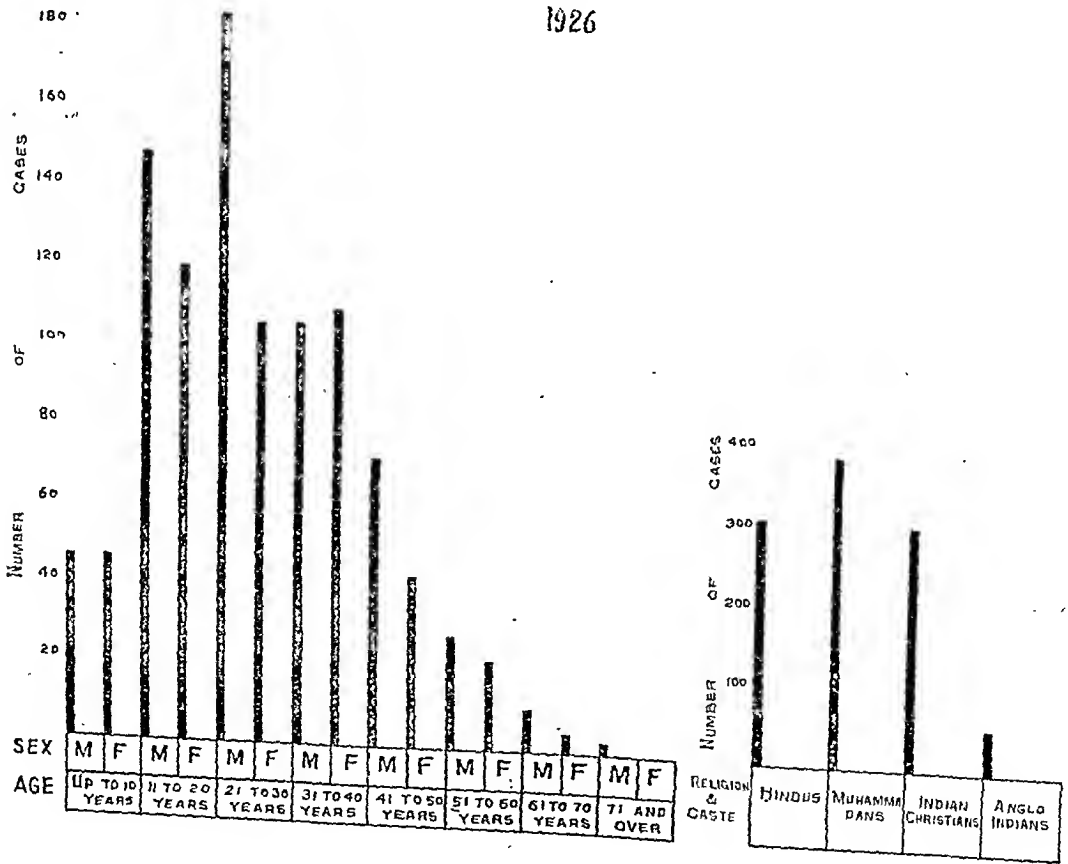
1909
(Col-Greig)



1925



1926



in 9 per cent., increased in 67 per cent., and normal in 7 per cent. Calf-pain was present in 84 per cent. Precordial pain was complained of by 24 per cent. There was a vascular mottling of the skin in 60 per cent., anæmia in 26 per cent., piles in 11 per cent., and dimness of vision in 4 per cent.

OTHER RECENT EVIDENCE.

Dr. G. Ghosh of Allahabad has kindly shown me a paper which he is contributing to the *Indian Medical Gazette*. The paper deals with the Allahabad outbreak of 1927, which has already been described in the *Indian Medical Gazette* of April 1928 by another former student of the senior writer Dr. R. N. Banerji. Dr. Ghosh's paper throws new light on the outbreak and is one of the most important recent contributions to the subject of the ætiology of epidemic dropsy. When Dr. Banerji sent us his report on the outbreak it occurred to us that rice from Bengal might have been responsible, as the disease was almost confined to Bengali residents of Allahabad and its occurrence after the subsidence of the Calcutta outbreak suggested that some dealers might have disposed of their stocks of rice to a distant market.

Dr. Banerji was unable to obtain any information regarding the importation of rice from Bengal, but Dr. Ghosh now supplies categorical evidence that large consignments of rice were received from Bengal by those Allahabad merchants who supplied the dealers from whom the Bengalis of Allahabad bought their supplies. These consignments arrived early in January 1927, and the disease broke out about a month later.

The other facts reported by Dr. Ghosh can hardly be explained on any other hypothesis than that of rice-intoxication. Allahabad is a place in which epidemic dropsy is uncommon, though a very interesting family outbreak occurred there about ten years ago which was described by Dr. R. N. Banerji and myself in the *Indian Medical Gazette* of February 1923.

LT.-COL. TAYLOR'S MEMOIR ON BERIBERI IN BURMA.

After the present paper had been written a very interesting number of the *Indian Scientific Memoirs* by Taylor, Martin and Thant appeared (March 1928). This has a very important bearing on the relationship between epidemic dropsy and beriberi and it may be stated at once that there is not a single statement in the memoir which would not apply with equal relevance to the discussion on epidemic dropsy in Bengal.

While we do not agree in every detail with the views of the authors our differences relate merely to the interpretation of their observations and not in the slightest degree to the observations themselves. Incidentally the same remark applies to the valuable reports on beriberi in India by Lt.-Col. McCarrison. Every observation which has been made by him on the beriberi of India

appears to us to be equally applicable to epidemic dropsy, and the differences which exist between Lt.-Col. McCarrison and ourselves relate entirely to our interpretations of the facts.

Col. Taylor and his colleagues do not deal with the clinical manifestations of the outbreaks of beriberi which they discuss, unfortunately they had little opportunity of observing patients and so were compelled to deal with the records which were available. But it is certain that their observations relate to the commoner forms of beriberi of the Far East.

The authors suggest that some of the school outbreaks which they deal with may have been of epidemic dropsy rather than beriberi, the reasons given being their greater explosiveness and the large percentage of the attacks. These are hardly sufficient grounds for differentiating between the two diseases as beriberi is often explosive and may attack most of the inmates of an institution.

The question of diets is very carefully studied, but in most cases the authors have to rely on diet scales and the usual dietaries of the classes of the community which are affected; the actual foodstuffs which were consumed before the onset were, of course, not available.

Some important generalizations could be made such as:—

1. The disease is essentially one of persons in the larger coastal towns and of small communities like labour camps, schools, jails, light houses, etc.

2. The disease attacks persons whose diet consists largely of rice which had usually been stored for considerable periods either in the husked or unhusked condition.

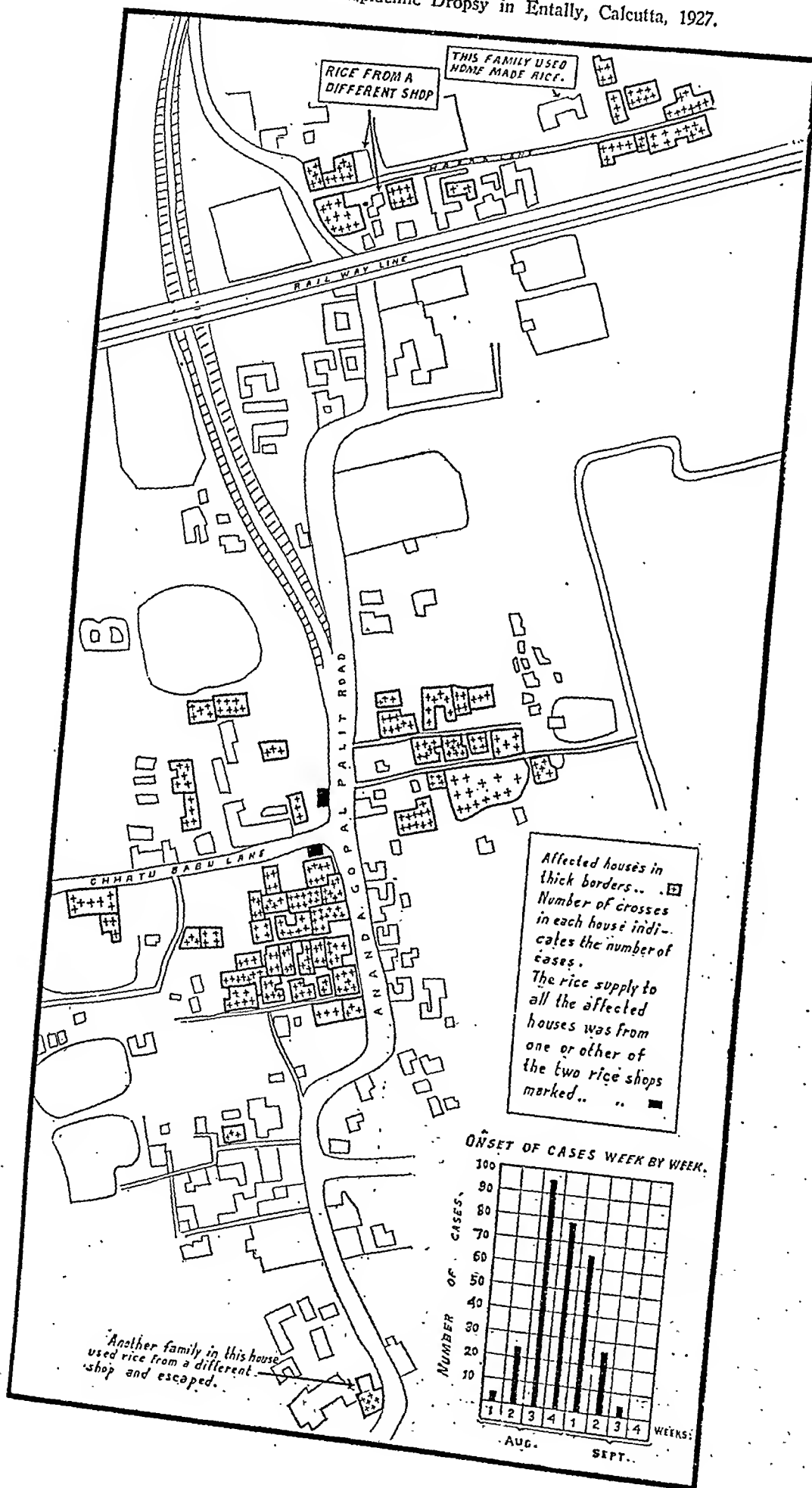
3. Deterioration of rice from damp and moulds appeared to the authors to be a very important factor in the outbreaks which they investigated; they are unable to decide whether a toxic substance is produced or whether the necessary washing of the mouldy rice causes a loss of vitamin content in the rice.

4. There is a definite seasonal prevalence commencing about two months after the breaking of the monsoon with a diminution during the cold weather months.

The authors evidently attach considerable importance to the vitamin content of the diet, but the numerous diet scales which are given do not suggest a deficiency in vitamin B; most of them contain a good proportion of *ata*, *dal* and fresh vegetables. In a school at Mowlaik in which an outbreak was observed in 1927, the diet was rice 1 to 1½ lbs. daily (hand-pounded but liable to deterioration from storage), *dal* 2 to 3 oz. a week, beans 2 to 3 oz. a week, fresh vegetables 4 to 12 oz. a week, meat 20 to 24 oz. a week, fresh fish 3 to 4 oz. a week, milk 7 to 14 oz. a week, fruit 14 to 21 oz. a week.

It is difficult to believe that severe avitaminosis could result from such a diet, or from most of the other diets which were in use by the persons who had the disease. A perusal of the memoir

MAP VI.
Outbreak of Epidemic Dropsy in Entally, Calcutta, 1927.



creates a strong impression that storage of the rice under unfavourable conditions and the formation of a poison in the rice is far more likely to be the universal causal factor rather than vitamin B deficiency.

In some of the outbreaks the diet was seriously defective in several respects, but in others the diets were less open to criticism than those of many millions of people in India in places where beriberi is entirely unknown.

The vitamin deficiency view has to be stretched to incredible limits before it can be made to embrace all the outbreaks which have been described.

In the forest camps the association of the disease with storage was exceptionally definite, the disease occurred among users of both hand-pounded and milled rice, but only when it had been stored for some time under unfavourable conditions; no cases were seen among the people who used either milled or hand-pounded rice which had been protected from adverse conditions during transport and storage.

The greater incidence of the disease among the persons whose diet consisted chiefly of large quantities of rice is not inconsistent with the rice-intoxication view, as the person who eats one pound of poisoned rice will ingest twice as much poison as the person who eats half a pound; besides, the person who eats larger amounts of wheat, beans, etc., will have better nourished and more resistant tissues than the one who eats little else than rice.

The important point is that Col. Taylor and his collaborators are firmly convinced of the necessity for attending to the proper storage of rice: if this fundamental principle is agreed to, it does not matter much whether the disease is an intoxication or whether it is caused by vitamin deficiency resulting from damage to the rice during storage.

The conditions under which beriberi occurs in Burma are remarkably similar to those in which epidemic dropsy breaks out in Bengal, the two diseases cause similar effects on health, and their prevention can be secured by exactly the same methods.

The memoir greatly strengthens our belief that epidemic dropsy belongs to the same disease group as beriberi and that both diseases are caused by rice-intoxication.

DISCUSSION OF THE OUTBREAKS DESCRIBED IN THIS PAPER.

Most of the outbreaks which have been described in this paper can only be explained on the hypothesis that the rice in use by the patients had in some way become poisoned during the period of storage, yet there are some observations which if taken by themselves would point to other possibilities, notably mustard oil poisoning and infection.

The Howrah (1927) outbreak, on the facts as stated by our informants, cannot readily be explained on the rice poisoning hypothesis and it

was obvious that the victims themselves firmly believed that one sample of mustard oil was to blame: it is just possible that their belief may have been due to a suggestion which gave rise to a mental bias and that the evidence which they gave may have been affected by that bias.

The Garden Reach outbreak of 1927 might be regarded as showing that immunity is established by a previous attack, while the relapses seen in Calcutta in 1927 are somewhat suggestive of the existence of carriers of infection.

These are concrete examples of the conflicting nature of the evidence which is obtained when we investigate the conditions of occurrence of a number of outbreaks of the disease, and it is obvious that a medical man who has only seen a single group of cases is liable to be strongly influenced by his own personal experience. In our discussion we take into account not only the numerous outbreaks observed by ourselves but also those recorded by others, as we believe that it is only in this way that the problem can be viewed in its true perspective.

It is impossible to reconcile every reported circumstance with any one hypothesis. The maps and the statements of the evidence which has been obtained, indicate that epidemic dropsy in Bengal has the following features:—

Epidemic Dropsy in Bengal.

1. It resembles other diseases of the beriberi group so closely that it cannot be separated from "beriberi," and therefore it may be classed provisionally as the "epidemic dropsy form of beriberi." At the meeting of the Far Eastern Congress of Tropical Medicine in Calcutta in December 1927, Lt.-Col. Vedder and Lt.-Col. McCarrison were shown the data which had been collected by us during the past few years; neither of them was able off-hand to suggest any criterion by which it is possible to form a separate disease group for epidemic dropsy as distinguished from beriberi. For these reasons it must be emphasized that when we use the name "epidemic dropsy," we do not imply that we are dealing with a special disease which is peculiar to Bengal.

2. It is a disease, essentially of rice eaters, the rice in use being usually parboiled undermilled rice.

3. The outbreaks of the disease are usually explosive.

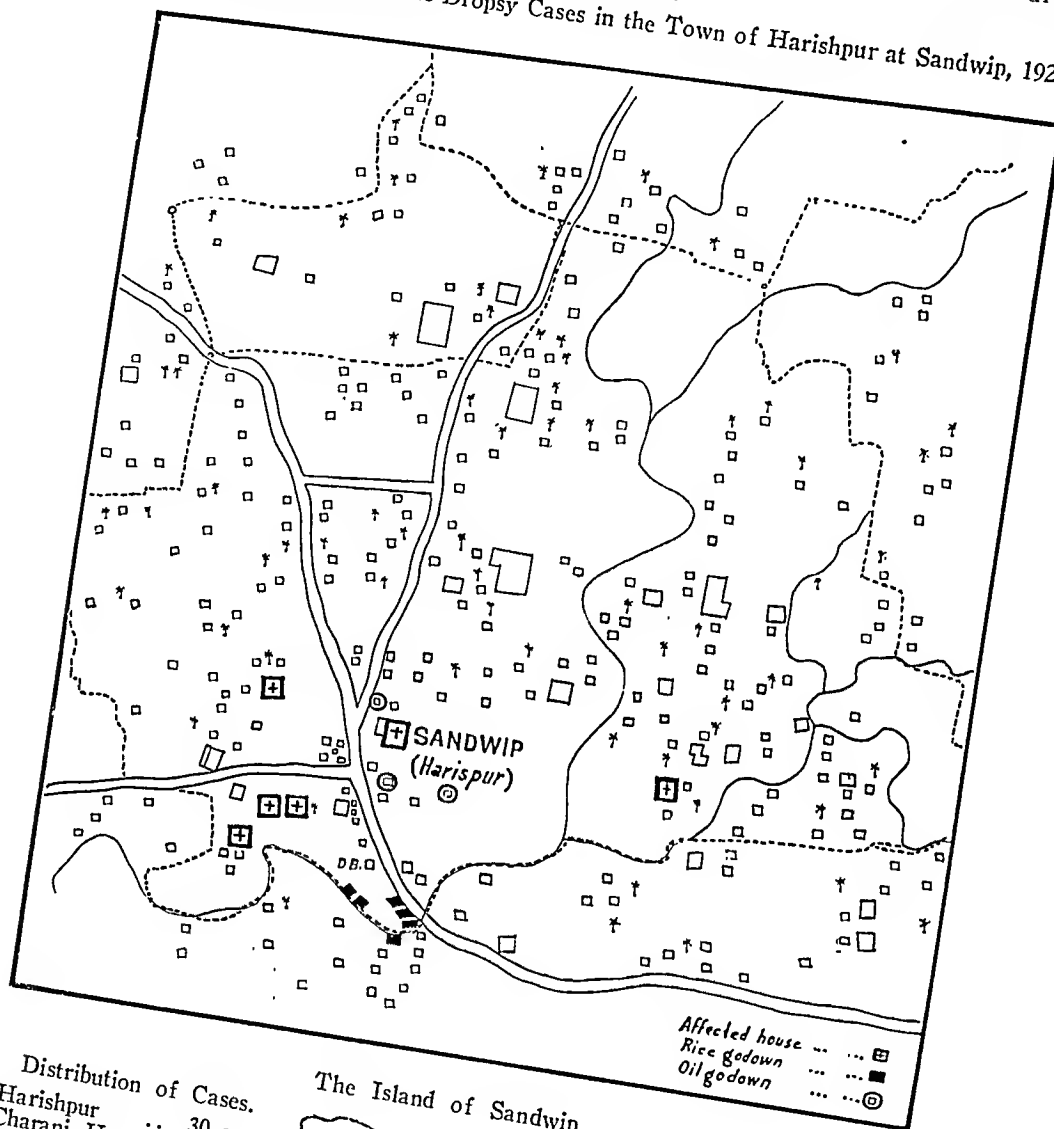
4. The disease almost always selects persons who have been using a stock of rice from a common source, though in a few outbreaks it has attacked several families living in the same locality in such a way as to suggest the possible presence of an air-borne organism which attacks the rice supplies of the neighbourhood.

5. The rice has almost invariably been stored in a hot and damp place for a considerable time after manufacture. Users of home-grown rice stored as paddy and prepared in small quantities for use are so rarely affected that the storage of paddy can be regarded as being almost without

risk, though it is desirable that paddy also should be stored under good conditions.
6. The only other foodstuff which is under suspicion is mustard oil. There have been a few outbreaks which, on the available evidence, are

ing can be completely excluded, in no case can rice poisoning be ruled out.
The distribution of the disease rarely fits in with the distribution of any common supplies of mustard oil, and as epidemic dropsy is so similar

MAP VII.
Distribution of Epidemic Dropsy Cases in the Town of Harishpur at Sandwip, 1926.

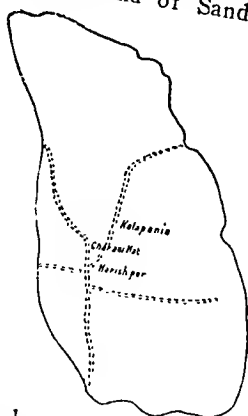


Distribution of Cases.

Harishpur	.. 30 cases.
Charani Hat	.. 8 "
Kalapania	.. 2 "

Cases occurred only among those who used imported rice, no cases among those using the locally produced rice.

The Island of Sandwip.



The supply of mustard oil came from Calcutta through three intermediate dealers who had their shops in Harishpur. The people all over the island used this oil.

most readily explained as being caused by a poison contained in mustard oil. The evidence which is opposed to the mustard oil view is so strong that we cannot accept these exceptional occurrences as having any important bearing on the problem. In many cases mustard oil poison-

to beriberi, it is inherently probable that the two diseases should also resemble each other in aetiology.
It is very unlikely that the Far East should have two very similar diseases which affect rice eaters, and that one of these should be associated

with rice while the other is associated with a very different substance.

Lt.-Col. Greig has already investigated and ruled out the mustard oil theory, and our own observations are in complete agreement with his.

7. The incidence of the disease does not suggest that the poison is usually present in rice, but rather that certain samples which may be sharply restricted contain the poison.

8. No association with any diet deficiency can be detected; the diets of the affected persons did not differ in any observable manner from those of their unaffected neighbours, nor did they differ from the diets in use by the affected persons before the disease appeared and after it had disappeared. In other words the diets were "the same," using the word "same" in the usual accurate manner in which it is usually employed by writers on beriberi. Of course, we regard the offending diet as being quite different from the normal diet though the difference is not one which is apparent if we deal merely with lists of articles of food or even with a casual inspection of the food. In food poisoning of various kinds, the foodstuff often looks and tastes exactly like wholesome food even in the case of such deadly intoxications as botulism.

It is impossible to believe that the disease could be caused by a deficiency of vitamin B; the explosiveness and the nature of the symptoms in themselves are enough to exclude this theory.

9. The evidence is very strongly opposed to the view of a person-to-person infection. There are one or two outbreaks in which at first sight the disease appears to have spread by infection, but these occurred in places where the disease was endemic at the time. Questionnaires were sent to more than a hundred doctors in Madhupore, Benares, Deoghur, Giridih and other places to which large number of patients went for a change while they were still suffering from the disease. In no case did we obtain evidence that the disease was communicated to other persons in these places. This point, also, has already been carefully investigated by Lt.-Col. Greig and our experience is entirely in keeping with his findings.

We have invariably found that persons who are suffering from the disease made a prompt recovery in every case in which they are put on a rice-free diet at an early stage of the disease; whereas if we had been dealing with an infection, the disease would be expected to run a course uninfluenced by diet. In severe and advanced cases in which irreparable damage has already been done to the tissues, improvement does not occur, nor can it be expected to do so.

10. In most cases the evidence points strongly to the existence of a preformed toxin in the rice, but there are some carefully observed cases in which it appears that the poison may continue to be formed in the intestine if a rice diet is allowed.

We do not exclude the possibility that a "toxic infection" may occur as well as an intoxication. In this respect, also, the disease may be analogous to some other kinds of food poisoning.

11. We do not express an opinion as to the micro-organisms which are concerned in producing the poison. These may be the bacteria which were isolated by Lebrede, Acton and others. We do not know whether the bacteria are normally present in stored rice or whether they are accidental contaminations as is the case with other food poisons. The place distribution of the disease suggests that an air-borne infection of the rice may occur in some outbreaks, and the manner in which certain ships and jails are affected year after year suggests that the store rooms in which the rice is kept may become infected with organisms which attack each fresh stock of rice.

The Prevention of Epidemic Dropsy and Beriberi.

We have already admitted that there are still many points with regard to which further investigation is needed.

The whole problem of the beriberi group of diseases still bristles with difficulties, but the more we investigate epidemic dropsy, the more firmly convinced are we that it is possible to lay down certain rules for the prevention and cure of the disease. These rules are not based on debatable opinions, but on extensive observations by ourselves and others. We have never encountered a case of the disease in a person who has lived on rice freshly prepared from paddy which has been stored under favourable conditions, nor in a person who has eaten carefully stored rice made from properly stored paddy.

RULE I.

We therefore insist on the rule that epidemic dropsy can be controlled by the use of rice which has been properly stored at every stage after harvesting.

We believe that the same will be found to be the case with the most important other forms of beriberi.

This rule can be accepted all the more readily because it is based on the dictates of economy and common-sense, apart altogether from its bearing on the causation of epidemic dropsy. The foodstuff of many millions of the human race ought to be properly stored, especially after it has been killed and mutilated in the process of manufacture.

When we include all forms of "beriberi" in our survey we admit that vitamin B deficiency and other dietetic deficiencies may play important parts in the causation of beriberi and other diseases, so that we willingly add a second rule.

RULE II.

The diets of all persons should contain sufficient quantities of all the nutritional elements, including the necessary vitamins.

We cannot conceive that any rational person will take exception to either of these rules, whatever may be his views on the relationship between epidemic dropsy and beriberi, or on the causation of these diseases.

If both of these rules are accepted and acted on, we believe that the beriberi-epidemic dropsy problem will cease to be urgent; it will become an interesting academic study for curious and ingenious investigators.

Incidentally, we believe also that the problem of pellagra ought to be studied on the same lines; vitamin deficiency is now being emphasized to the exclusion of other aspects of the disease; storage of maize may be the clue to pellagra, and even if this is not the case, there should be no hesitation in adopting rational measures for the preservation of maize and maize products at every stage from the harvesting of the grain.

Our attitude towards vitamin B has never been of the nihilistic kind that has been attributed to the senior writer by some authorities. Vitamin B deficiency ought to receive its fair share of attention, but it should not be allowed to obsess our minds to such an extent that we refuse to admit the possible existence of other factors in beriberi-epidemic dropsy, pellagra and other diseases associated with diets.

"EMERGENT SURGERY" IN HEAD INJURIES.

By K. M. NAYAK, L.M. & S.,

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"A SCALP wound properly cleansed, antiseptised and drained, represents in a highest degree the possibilities of good surgery," writes Donald J. Armour; "a scalp wound improperly cared for, covered with hair and matted blood, and its extent undetermined, represents one of the worst forms of surgical neglect." This statement is so true that it requires no further elaboration. Although, in my fifteen years of service, I have not seen very numerous cases of head injuries, yet in 1927, a particularly large number of such cases presented themselves at this hospital, and an account of them may raise points of considerable interest.

Lejars, in his "Urgent Surgery," states that the medical practitioner should always be ready for emergency surgery, but how many men keep their equipment for such work in good condition? Only too often are important instruments allowed to get rusty, or jumbled up in a bag with dressings, chloroform, stethoscope, and thermometer. When the emergency arises, the instruments are not fit to use, are rusty and may break. One would state that the following instruments at least

are essential, and that they should be kept separately, and frequently examined to see that they are in good condition.

Cutting Instruments.—Two or three scalpels, two pairs of scissors—straight and curved, and a pair of Liston's bone forceps, angled on the flat. Alcohol, chloroform or petrol may be used to ensure their absolute cleanliness after use; their edges should be perfect, and they should be kept lightly smeared with vaseline. Two grooved directors—one grooved to the tip and the other probe-pointed; one pair of dissecting forceps, another pair with teeth; two double-ended retractors are also essential. An emergent surgeon's safety lies in the number of artery forceps which he possesses, and for work on the head one can hardly have too many; whilst it is as well to complete the series with six pairs of Kocher's artery forceps. Two hand trephines, one of half an inch diameter, and one three-quarters of an inch diameter are also essential.

An aneurysm needle, one or two pairs of volsellum forceps, a curved periosteal elevator, a raspator, a gouge forceps, a chisel and mallet, are all necessary.

Ligatures and Sutures.—Here it is absolutely essential to use only the very best and most reliable material. It is as well to have catgut, silk, linen thread, and silkworm gut. If catgut properly prepared and sterilised beforehand is not available, it is better to dispense with it.

Needles.—Ordinary straight and curved needles of different sizes are all that are needed. Half curved ones are sometimes useful, but often give more trouble than real help. Fixed needles mounted in handles, such as Doyen's, are extremely useful in suturing the scalp. Michel's clips are even better, and give great precision and exactness in apposing the cut edges.

No wound of the scalp should be regarded as unimportant, and it is essential thoroughly to clean, disinfect and explore the wound. "Excluding some cases where there has been considerable loss of tissue, hernia cerebri is almost invariably due to inflammatory causes, and asepsis is the best means of preventing it," writes Lejars. Anaesthesia should be resorted to freely, and especially in the case of children, in whom it is frequently impossible to explore a scalp wound properly without a general anaesthetic. Continuous irrigation of the wound with normal saline at a temperature of 110° to 115°F. is often very helpful. The use of a tourniquet, fixed tightly round the head across the forehead, just above the ears, and beneath the occiput, is useful in controlling hæmorrhage, and is too often neglected. The importance of shaving and disinfecting a wide area of the scalp surrounding the wound, lies in the fact that it facilitates the thorough and satisfactory examination of the wound in all its depth. Provision should always be made for drainage. In cases of general oozing from the scalp edges and from the pericranium at the bottom of the wound I have always found hydrogen peroxide very useful, for it is a hæmostatic

as well as an antiseptic. The supposed danger of air embolism from the use of this drug is a myth, and I have often used it freely.

Every attempt should be made to save as much of the scalp tissue as possible, for the great vitality of the scalp tissues is a powerful factor in repair. In one of my cases almost two-thirds of the skull was completely denuded of scalp tissue, but luckily for the patient the scalp was hanging by a pedicle half an inch wide. I simply cleaned the whole flap and skull with nothing but warm sterile water, and then carefully sutured the whole flap back into position, with four gutter drains at the corners. On the sixth day, when the stitches were removed, the union between the edges was perfect. Cases are even recorded where the completely torn-off scalp has been thoroughly cleansed and replaced in position with a few sutures, leaving very free drainage, and where the implantation has succeeded.

Compound Fractures of the Skull.—In this connection, certain points are important. A linear fracture should be thoroughly opened up. Sometimes a sharp, clean cut edge of the epicranial aponeurosis, or even the cut edge of the pericranium itself, may give the impression that the bone underneath it is fissured, but careful examination will show that it is not. I have myself been misled in this way on two or three occasions. Acute infective osteomyelitis is a rare, but dangerous complication of such cases, leading to the appearance of "Pott's puffy tumour," with high fever and rigors. The bacterial infection in these cases is not always necessarily from the external wound, but may occur by auto-infection, just as a hæmatoma may sometimes suppurate in a much-debilitated patient. In some rare cases, infection may occur from the middle ear.

Where there is a fissured fracture of the outer table, always suspect the presence of more extensive damage to the inner table. To examine the fracture with a probe is a dangerous and ineffectual proceeding; it gives one but very little information, and may spread infection. It is usually necessary to open up with the chisel and mallet and lay bare the *diploë*. If a gaping fissure is present, with the margins at different levels and blood continuously flowing from it, or if a star-shaped depression or a localised crushing of the vault is present, then the best line of treatment is by means of an osteoplastic flap, or, failing this, a trephine hole should be made and the extent of damage to the inner table explored. All irregular fragments must be carefully removed. Do not simply raise them and leave them in place. Never try to tear them out or lever them out from one edge; the dura may be torn or the brain compressed or lacerated by such manœuvres. Seize the fragment transversely about the middle, and raising it gently, separate the underlying dura with a curved elevator or dissector.

If the dura is torn, the cavity should be very gently cleansed with small gauze or wool swabs

on the end of a pair of forceps. Bleeding cortical vessels should be ligatured by passing a ligature on a fine curved needle underneath them. The dura should not be completely closed, and drainage should be provided for. In cases of compound fracture of the skull with depressed bone, operation should be undertaken at once, whether focal cerebral symptoms are present or not. In cases of comminuted fracture, or where a large segment of the skull has been driven in, when the fragments—usually triangular or star-shaped—remain locked together, the attempt should be made to raise by one of its edges that fragment which appears to be the most detached and most moveable. After the first fragment is removed, the others can usually be dealt with easily. Below the layer of superficial splinters will be found the layer of deeper fragments. These should be raised gently, separating the underlying dura mater with a curved elevator or a director; they should never be torn out. Wherever necessary, make more room by the gouge forceps, as the extraction of endocranial scales is of the utmost importance for future recovery.

Trephining should not be regarded as a highly specialised operation and dangerous proceeding, which only specialists should carry out; for it is often called for in emergent surgery. The specialist may make use of the electric burr, or the brace and burr, either Hudson's or Doyen's, or even Albee's saw method, but the ordinary practitioner must be able to deal with the ordinary case. The trephine which I have always successfully used is the ordinary hand—or so-called "crown" or "circular"—one. It is inexpensive, slow in operation—perhaps—but always obtainable, steady, and sure. In trephining, safety perhaps counts for more than any other factor, and the hand trephine is safer in the hands of the novice than the more complicated instruments. The instrument, however, should be of the best possible description and of small diameter, half or three-quarters of an inch, sharp edged, and fitted with a heavy handle. On striking the inner table of the skull special care is required, as rough or unequal trephining may lead to injury to the dura mater, meningeal arteries, etc. It is very debatable whether the brace and burr pattern presents any real advantage over the ordinary hand trephine, with the possible exception that it may afford some additional safeguard against damage to the dura mater. Experience alone will decide which method appeals best to the operator.

Cranicectomy.—Before applying the craniectomy or enlarging forceps, the dura mater must be separated from the bone. The action of the forceps should be a nibbling one, and no attempt should be made forcibly to avulse fragments. The fragments removed by the trephine and the enlarging forceps are useless for purposes of bone regeneration, and are actually dangerous in the event of sepsis. Where a fragment of bone is completely detached all round, simple elevation of it is unsatisfactory, as it may subsequently

cause either sepsis or compression symptoms, and it should be removed. On the other hand, it is necessary to guard against any greater denudation over the surface of the brain than is absolutely essential.

Hæmorrhage is a constant source of trouble in these operations. In hæmorrhage from the diplœ, the use of Horsley's "bone wax" may be useful. Its composition is as follows:—

Vaseline	..	..	50 parts.
Paraffin	..	..	50 parts.
Acid carbolic	..	..	50 parts.

A meningeal artery is best dealt with by passing beneath it a ligature on a fine curved needle, and the same procedure may be applied to a cortical vessel. For general oozing, hydrogen peroxide is very valuable. Every endeavour must be made to ascertain the source of the hæmorrhage; for bleeding from a sinus immediate occlusion with a finger is indicated, then a prompt attempt should be made to underpin it with a ligature in a curved needle, though the pressure in tightening the ligature must be very gradually applied; or, finally, plugging may have to be resorted to. On two or three occasions, I have had to resort to plugging; once, when operating for mastoid abscess, I opened the sigmoid sinus, on which occasion I removed the plug on the third day, found the wound quite dry, and the patient made an uneventful recovery. Where the source of the bleeding cannot be ascertained, irrigation with hot saline at 115°F. is often a useful measure, followed by plugging.

No operation for compound depressed fracture of the skull should be considered complete until the depressed fragments have been elevated or removed, the hæmorrhage checked, and the entire exposed area cleansed and disinfected.

The respiratory centre is very nicely balanced, and it may fail in the early stages of administration of the anæsthetic. If so, trephining must be carried out rapidly, and artificial respiration commenced. The use of x-rays is often helpful in estimating the thickness of the skull; in the temporal and cerebellar regions in adults, and in the skulls of children, the bone may be unusually thin, and in such cases the pin of the trephine should be discarded earlier than usual. In bandaging, even pressure over the whole area should be aimed at, and it is often not necessary to bring the bandage over the chin. On returning the patient to bed, he should be placed in the semi-recumbent position with the head thrown slightly backwards, reclining on pillows. The administration of morphia previous to operation is often helpful in preventing restlessness, pain, and excitement after operation. It is often helpful to keep the patient under the influence of morphia for 24 to 48 hours after the operation, or bromides or chloral may be given. Stitches should be removed on the sixth or eighth day (since wounds of the scalp heal very rapidly, and more so than wounds elsewhere in the body), but

the patient should ordinarily be confined to bed for three weeks, and special care should be paid to the avoidance of post-operative constipation.

With regard to the question of when to operate, it is clear that a patient in a condition of profound shock is not a suitable subject for instant operation. Morphia should be given, and he should be allowed to pass into the stage of reaction before operation is carried out. On the other hand, too much delay is fatal. The period of immediate shock does not usually last more than twelve hours, and the onset of symptoms of compression is marked by a slow pulse, low blood-pressure, Cheyne-Stokes' respiration, and profound unconsciousness. Attention should be directed, not so much to ascertaining the presence or absence of a fracture of the skull and its location, as to the degree and extent of the damage to the brain.

In selected cases, lumbar puncture should always be carried out. It is a most useful aid to diagnosis in doubtful cases, as the presence of blood in the cerebro-spinal fluid may confirm the diagnosis of fracture of the skull. On the other hand, the presence of blood in the cerebro-spinal fluid merely denotes bleeding from an intradural vessel, with or without a fracture of the skull, and the absence of blood does not exclude an intracranial hæmorrhage. Where initial stupor persists and the patient remains unconscious, with laboured respiration and slackening pulse, 15 to 20 c.c. (5 to 6 drachms) of cerebro-spinal fluid should be withdrawn as a therapeutic measure. This may be repeated the next day, whilst daily removal of 15 to 20 c.c. of fluid often gives great relief to cases characterised by headache, nausea, dizziness, stupor, and restlessness. Lumbar puncture, however, can never take the place of a decompression operation.

With regard to the complications arising after operation, but little can be done for cases of meningitis, encephalitis, and ventriculitis. Acute abscess of the brain after operation is usually due to the retention of some foreign body, whether fragments of bone or some piece of stone driven into the wound from a fall. Removal of the foreign body and free drainage are essential. Hernia cerebri is a difficult condition to deal with; often lumbar puncture is useful in such cases, or a fresh decompression operation may have to be undertaken. The formation of scar tissue in the cerebrum may lead to insomnia, fits, paralysis or spasticity. It should always be borne in mind that the surgeon is responsible, not only for the immediate future of the patient, but for his later working capacity, and a depressed fracture which has not been properly treated, or a blood clot which has not been removed, may lead to irreparable injury in future years.

In general, one may say that these cases should be operated on at the earliest possible moment (after shock has been alleviated). Unless the surgeon is fully convinced either that the injury is an undoubtedly fatal one, or so trivial that it

can be ignored, it is his duty to explore the nature of the injury very fully; to administer a general anæsthetic whenever necessary and to remove all sources of irritation. These cases are not—as is so often supposed—minor ones; they may be amongst the most important ones in the general practice of surgery.

APPENDIX: ILLUSTRATIVE CASES.

Case 1.—Male patient, aged 40, a criminal lunatic. He was drying his clothes after washing them when a second criminal lunatic in the same asylum suddenly seized an iron bar from the smithy, and commenced to attack all and sundry whom he met. Three persons escaped with trivial injuries, and two had their heads smashed and converted into a pulp, and died on the spot. The sixth was the patient referred to. He had a compound depressed fracture in the right temporal region, was completely unconscious, and had complete paralysis of the left side of the body. The pulse was full and bounding, and the respiration laboured, deep, stertorous, and of Cheyne-Stokes type. At operation, a piece of the right temporal bone about the size of a quarter-anna piece was found depressed, and jammed down on to the brain beneath. The middle meningeal artery had to be ligatured, the depressed piece of bone removed, and a large extradural clot turned out. The dura mater was fortunately intact. Continuous irrigation with hot saline was applied during the operation, and free drainage provided.

The patient was conscious the day after operation, and the paralysis had disappeared. The wound healed by first intention. I saw the patient six months after operation, when he was perfectly fit and had developed no untoward symptoms and showed no signs of hernia cerebri.

Case 2.—A male coolie, aged 35, was gored by a bull. This injury is a common one in these parts, and is usually to the abdomen, but in this instance it was to the head. On an average we get some six to nine such cases a year,—often with the viscera protruding and wrapped in filthy clothing,—yet such is the resistance of the peritoneum that very few of them die.

In this instance nearly two-thirds of the scalp had been removed, and was hanging by a pedicle half an inch wide in the occipital region. The almost torn-off scalp was thoroughly cleansed, replaced in position, a few sutures inserted, and free drainage provided. The wound healed by first intention, and the patient made a sound recovery.

Case 3.—Male coolie, aged 38, was digging at the bottom of a well when a piece of wood from the well head fell and struck him. On admission there was a lacerated wound some 3 inches long over the vertex, with a gutter-shaped fracture at its bottom. He was fully conscious. On operation, it was found that both parietal bones were involved in the depressed fracture, and the sagittal suture lay in its floor. The inner tables of both bones were found to be intact on trephining, but blood was oozing from the superior longitudinal sinus. This was controlled by pressure, and the patient made an uneventful recovery. He left hospital fifteen days later, but whether he developed a hernia cerebri or not, I do not know. It seems improbable.

Case 4.—A boy of 10 years of age who was stated to have fallen about 10 feet from the plinth of his house. On admission he was unconscious, with a temperature of 102°F., and a lacerated wound in the right temporal region. At operation, a depressed fracture of the right temporal bone was found. The middle meningeal artery had to be ligatured. The dura mater was intact. The patient made an excellent recovery, and five years later was in good health.

Case 5.—This is a case, which is of interest from the medico-legal point of view. The patient, a wealthy landlord, aged about 50, was attacked with *lathis* in a riot. He had no less than 32 injuries on admission, most of them on the trunk. There were one or two contusions on the head; however. On admission, he was

suffering from shock, but regained consciousness the next morning and was able to talk. The next day he became very irritable and restless and lapsed into a semi-conscious condition. A lumbar puncture was done and 25 c.c. of cerebro-spinal fluid removed. This was slightly blood-tinged. For the next three days the patient was conscious and appeared to be recovering rapidly. On the fifth day after injury, he complained of very severe headache. Lumbar puncture was again carried out, and 20 c.c. of fluid removed; this immediately cured the headache. Unfortunately, he now developed hypostatic pneumonia, and died on the seventh day after injury.

On the second day in hospital, the deceased had what was rather like an epileptic fit. At post-mortem a small blood clot, about the size of a quarter-anna bit, was found in the region of the right middle meningeal vein. The artery was intact. The skull bones were intact and there was no basal fracture. Being a rather obese subject, he had a certain degree of fatty degeneration of the heart.

The case was tried in the lower court, where 14 persons were put on trial as possibly concerned in the riot and in the death. The defence was that the death was due to hypostatic pneumonia and heart failure. The case was referred to the High Court, which finally ruled that death was due to natural causes and hypostatic pneumonia, and discharged the accused. On the other hand, one is convinced that, had the deceased not sustained the cerebral injury discovered at the post-mortem examination, he would have been alive to-day.

Case 6.—This case again was of medico-legal interest. The patient, a male aged 30, was hit on the head by another man with a stout stick, and received a lacerated wound in the left frontal region. He saw a local doctor the next morning, who gave him a medical certificate, and failed to notice that there was a depressed fracture at the bottom of the wound. The patient was both conscious and rational in his speech.

On the fourth night after the injury he began to develop symptoms of cerebral irritation, and was brought into this hospital on the fifth night after injury, with a temperature of 103.2°F. A diamond-shaped depressed fracture of the frontal bone was discovered at operation, about one inch by three-quarters of an inch, with laceration of the dura and injury to the surface of the left frontal lobe of the brain. The patient's temperature rose to 107°F. after operation and he died two hours later.

At post-mortem, a fracture of the anterior fossa was discovered and a condition of acute spreading œdema of the brain. The immediate cause of death was paralysis of the higher centres of the brain. The cerebro-spinal fluid was under pressure, and compression of the medulla was probably present. The case for the defence was that the deceased, when drunk, had fallen and hit his head on a stone, which was produced and appeared to be blood-stained. A test by the Imperial Serologist, however, failed to recognise any trace of blood on the stone. Five of the six accused were acquitted, but a sixth, who was stated to have thrown the stone, was sentenced to one year's rigorous imprisonment.

In this case, lumbar puncture at the moment when pressure symptoms were first recognised, might have saved life. The giving of the first certificate by the local doctor on the day after injury, and the fact that he clearly failed to recognise the severity of the injury, are special features of the case.

Case 7.—This was a female child, aged 7. Whilst her father was lopping off the branch of a tree, she was standing below the tree, about 12 feet below, when the axe fell out of his hands and struck her on the vertex. There was a comminuted fracture of the right parietal bone, with a smaller but similar lesion of the left parietal. All comminuted pieces had to be removed, and the superior longitudinal sinus was found to be badly lacerated and bleeding profusely. Firm plugging was applied, and the patient's condition, from shock and hæmorrhage, was bad. She made a

splendid recovery, however, and was discharged from hospital a month later in sound health.

Case 8.—This was a male child, aged 6 years, kicked on the right side of the forehead by a cow. The brain substance was protruding from the site of injury. There was no sign of paralysis or of cerebral irritation. At operation a small detached piece of bone was removed, which had become detached and buried in the brain substance. A month after his discharge from hospital, the small patient was brought back to hospital with a visibly pulsating mass in the right temple. This was dressed daily with dressings of a copper sulphate lotion. On the fifth morning it suddenly disappeared, and the patient made a complete recovery. What had happened here is quite uncertain. The patient had no hernia cerebri when discharged from hospital. The tumour, when it appeared, showed undoubted pulsation. The favourable termination of the case was at least fortunate.

Case 9.—Male patient, aged 35, who fell over a stone, and sustained a lacerated wound running from the middle of the left eyebrow to the scalp. There was a gutter-shaped fracture of the left frontal bone, and the left frontal sinus was also involved. At operation trephining had to be resorted to, but the patient made an uneventful recovery, and was discharged cured.

Case 10.—A male patient, aged 14, who had sustained a fall. At operation a depressed fracture of the right parietal bone was found. Trephining had to be resorted to, and a branch of the middle meningeal artery tied. The patient made a sound recovery.

Case 11.—A male patient, aged 37, who had received a blow during a scuffle, the result of a stone which had been thrown at him. There was a lacerated wound at the back of the head, and a compound depressed fracture of the left parietal bone. The outer wound was about an inch in diameter, but the lesion to the inner table only five-eighths of an inch by half an inch. He was discharged in good health a fortnight after admission.

Case 12.—A male patient, aged 18, who was stealing mangoes from a tree, and fell immediately he picked the first mango. He had a lacerated wound on the left side of the forehead, with a compound depressed fracture at the bottom of the wound. The left half of the frontal bone was also fractured and depressed inwards into the brain. The scalp wound was slightly oedematous, owing to injury to the left frontal air sinus. The dura mater was badly torn and the brain very badly lacerated. One fragment of bone was actually deeply buried in the brain. Despite this, he was operated on and left hospital 18 days later in good condition.

Case 13.—Boy, aged 15, who fell from a mango tree, and had a compound depressed fracture of the frontal bones running for nearly 4 inches above the superciliary ridges. The dura mater was badly torn and the brain matter literally flowing from the wound. He was discharged from hospital a month after operation in sound health.

Case 14.—The patient, a male aged 50, fell to the bottom of a well nearly 30 feet deep. On admission, he had a badly lacerated wound on the top of the head, running from behind forwards in the middle line. On exploring the wound, it was found that there was a severe diamond-shaped depressed fracture of both parietal bones, with extensive comminution. There were two perforations of the dura mater, and the brain was injured underneath these. The superior longitudinal sinus fortunately escaped. The area of brain denuded of bone was diamond shaped, and measured 4 inches by 2 inches. Unfortunately, the patient died on the fourth day after operation.

Case 15.—The patient, a male aged 35, was working at the bottom of a well when the wooden beam at the top of the well fell a distance of some 20 to 25 feet and hit him directly on the vertex. There was a longitudinal wound about 2 inches long, with a depressed fracture of the right parietal bone. At operation the whole of the right parietal bone was exposed, and a lozenge-shaped piece was found to have been detached and buried in the brain matter underneath. The fracture

fortunately stopped half an inch short of the middle line and the superior longitudinal sinus. No trephining was necessary. On admission he had slight paresis of the left arm, but this was gradually recovered from. He left hospital cured a month after admission.

Case 16.—This patient, a male aged 30, was also injured whilst working at the bottom of a well, a large stone having fallen on to him from above. On admission, there was complete hemiplegia of the left side of the body. There was an irregular depressed poul-like fracture to the right of the middle line. The right parietal bone had to be trephined, and a branch of the middle meningeal artery tied. One fragment which was very loose was removed, but a second was elevated and left in position. The hemiplegia cleared up immediately after operation, and the patient left hospital cured on the 22nd day.

Case 17.—This was a case of medico-legal importance. The patient, a male aged 45, was injured on the right side of the forehead during a riot. He came to hospital at 11 o'clock on the night of the injury, walking, and fully conscious. There was an irregular wound about one inch by half an inch above the outer half of the right eyebrow; also minor injuries to other parts of the body. He refused to stay in hospital and went to his home for the night, but returned to hospital the next morning. For the first six days he appeared to be doing well, but suddenly dropped down dead about 11-30 p.m. on the night of the seventh day after injury.

At post-mortem, a crescentic fracture of the frontal bone was discovered. Starting from the zygomatic process, it passed backwards along the roof of the orbit. During life, there had been no signs or symptoms indicating trephining or the necessity for elevating the bone; it appeared to be a simple fissured fracture. But at post-mortem examination, a condition of acute spreading oedema of the meninges at the base of the brain was discovered, and the immediate cause of death was apparently paralysis of the higher centres of the brain. The cerebro-spinal fluid was under pressure, and there was probably medullary compression as well. A timely lumbar puncture might have saved life in this instance, but the symptoms were not such as to call attention to the necessity for it.

The medical officer who was called into court gave it as his opinion that the injury might have been caused by a stick. The defence said that it was caused by a stone; they said that the deceased was drunk at the time of the occurrence, and that he fell and hit his head on a stone, and proceeded to produce the alleged blood-stained stone. The Imperial Serologist, however, failed to find any trace of blood on the stone. The judge acquitted five of the six accused, and sentenced the other to one year's rigorous imprisonment only.

I have perhaps said sufficient to show the importance in general medical practice of head injuries, and the necessity for the general practitioner to be constantly prepared to deal with them at any hour of the day or night. He requires an armamentarium carefully selected beforehand, and kept in the very finest of working order. Further, he must remember that he may at any time be called in to give medico-legal evidence in connection with such cases. The questions that he may be asked in court, indeed, are sometimes ludicrous. Lately I was asked in court whether an infant four months of age could have committed suicide by leaping down a well. When the facts of the case came to light, it was discovered that the child had been thrown down the well by his mother, since it was a male child and illegitimate, and she did not wish it to grow up and interfere with her clandestine trade. In another case, it was suggested to me that a newly-born baby had committed suicide by swallowing

a handful of ashes. Is the answer to be that death was due to "heart failure," or to "carelessness," or "to an eclipse of the moon"?

TRACHEOTOMY FOR DIPHTHERIA IN CHILDREN.

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THERE is considerable difference of opinion as to whether a low or high tracheotomy should be performed for the relief of urgent dyspnoea in children suffering from diphtheria. There are objections against either form. But so far as I am aware, there appear to be more objections against the performance of a low tracheotomy than against that of a high one.

In high tracheotomy, especially in children, laryngeal stenosis sometimes occurs, due to oedematous granulations at the seat of operation, which is very close to the larynx. Thus, in a series of 53 cases where high tracheotomy had been performed, in 5 laryngeal stenosis was observed with the result that the little patients could not do without their tracheotomy tubes. On removal of the tube, urgent dyspnoea with cyanosis supervened. In one case for the relief of this symptom the tracheotomy tube was taken out and intubation was attempted without success, owing undoubtedly to the stenosis that had taken place. In every one of these cases low tracheotomy had again to be performed, which made the healing of the high tracheotomy wound possible and led to the disappearance of the oedematous granulations. After 4 or 5 days, the low tracheotomy tube was removed without any trouble. In the 77 cases of low tracheotomy performed by me, there was not a single instance where dyspnoea persisted after removal of the tracheotomy tube in the usual course in 2 to 3 days.

The objections against a low tracheotomy are, (1) that the trachea in the lower part of the neck lies deeply, (2) that there is a danger of injuring the large vessels, which pass into the neck from the thorax, (3) that owing to the depth, which separates the trachea from the skin wound, a large tracheotomy tube is required as otherwise it is coughed up, (4) that there is a danger of producing mediastinal cellulitis, and (5) that there is a likelihood of driving the diphtheria infection into the trachea. Thus, the arguments against a low tracheotomy appear to be quite formidable, but fortunately do not stand examination. When a low tracheotomy is performed in what I consider the proper way, there is no danger of wounding any large vessel, such an accident never having occurred in any of my cases. As for the other objections they appear to me to be purely theoretical, as I have never seen mediastinal cellulitis or extension of the diphtheritic membrane into the trachea when it had not already been there. In children, the depth at which the trachea lies is not great, and does not make the

operation in any way difficult. It is also quite easy to fit a proper sized tracheotomy tube into the trachea.

It will thus be seen that when correctly performed a low tracheotomy, as it does not produce laryngeal stenosis and is also definitely indicated in those cases where the diphtheritic membrane has extended from the larynx to the upper part of the trachea, is the operation of choice.

In all these cases apart from septic bronchopneumonia, which is almost always present, the heart is enfeebled, as is well-known, by the diphtheritic toxin. It is therefore not advisable to use either ether or chloroform as a general anaesthesia in these cases, nor is such anaesthesia necessary, the only pain in the operation being a momentary one caused by the skin incision.

Descriptions of tracheotomy operations in textbooks are frightening, as is the situation where the operation is performed. Thus, a simple operation, which may be performed in 2 or 3 minutes, is regarded with fear by the general practitioner in this country and is not attempted, this resulting in death to many little children.

I will now take the liberty of describing the operation as I perform it. To me it seems that it would be better for beginners to forget the existence of all the vital structures which lie in the neck round about the trachea, because they are far away from the field of operation. The only caution necessary is that one should stick strictly to the middle line. In performing the operation, the structures that will come in the surgeon's way are the two anterior jugular veins, Burns' space, the thymus, the trachea, the inner edge of the sterno-thyroid muscles, and the thin line of deep fascia between them.

After having cleaned and sterilized the neck in the usual way, extend the neck by raising the shoulders on a sand bag and holding down the head at a lower plane. The little patient is rolled up in a sheet to make movement of the limbs impossible. One assistant holds the patient down by the lower limbs and another holds the head with great care, keeping it in the middle line. The surgeon stands to the right side of the patient.

Putting the tip of the index finger of the left hand at the sternal notch, a longitudinal incision about 2 inches long should be made exactly in the middle line down to the investing layer of the deep cervical fascia. This brings into view the thin line of deep cervical fascia between the sterno-thyroids in the middle line, and also resting on the muscles on either side the two anterior jugular veins. There is little or no hæmorrhage at this stage of the operation, and there is no pain felt subsequent to this. With the sharp edge of a small scalpel directed towards the chin pierce the deep cervical fascia at the level of the lowest points reached by the anterior jugular veins before they disappear into Burns' space to communicate with each other, and continue dividing the two layers of the deep cervical fascia which

form the walls of Burns' space. The large vessels, which pass from the thorax into the neck, are situated well below this level behind the pre-tracheal fascia. This incision should be carried upwards, that is towards the chin, for a distance of an inch and a half. The knife should penetrate to a depth of about half an inch and keep strictly to the middle line. There may be a little bleeding due to the division of a few very small veins which are congested. None of these vessels requires any attention. If the soft tissues thus incised are now separated, the thymus comes into view and the outline of the trachea behind the pre-tracheal fascia can be perceived.

To perform the next stage of the operation, the thymus is pulled down with a hook by an assistant. With the tip of the left index finger the trachea is palpated immediately above the thymus, and a half inch longitudinal incision is made into it through the pre-tracheal fascia with a tenotomy knife with its sharp edge directed towards the chin. The edges of the tracheal incision are now separated by the tracheal dilator and a well-fitting silver tracheotomy tube fitted into it.

The retraction of the soft tissues is only necessary for beginners, and for this purpose the self-retaining retractor devised by me will be found useful. It assures not only wide separation of the tissues, but also secures equal separation on either side of the middle line, preventing lateralization of the trachea. It can be steadied by the tip of the left index finger while the knife incises the trachea between its two blades. The old fashioned hook retractors do not bring about equal retraction on either side, whether the retraction is done by an assistant or by the surgeon himself. The result often is that the trachea is pulled more to one side than the other, thus confusing the beginner. An illustration of the

retractor is given below. The operation is now finished by carefully bringing the skin edges together above and below the tracheotomy tube. There is no danger to any vital structure if the operation is performed as described above, and it takes only about 2 minutes to do it.

One helpful suggestion may here be made for the beginner, and that is that before incising the skin the line of incision exactly in the middle line may be traced on the skin with the point of a needle, the knife later following this line. Hooking the trachea to fix it is unnecessary. Retraction of the soft structures by hooks is confusing. Chloroform or ether as a general anaesthesia is positively dangerous.

THE INTENSIVE TREATMENT OF KALA-AZAR BY NEO-STIBOSAN.

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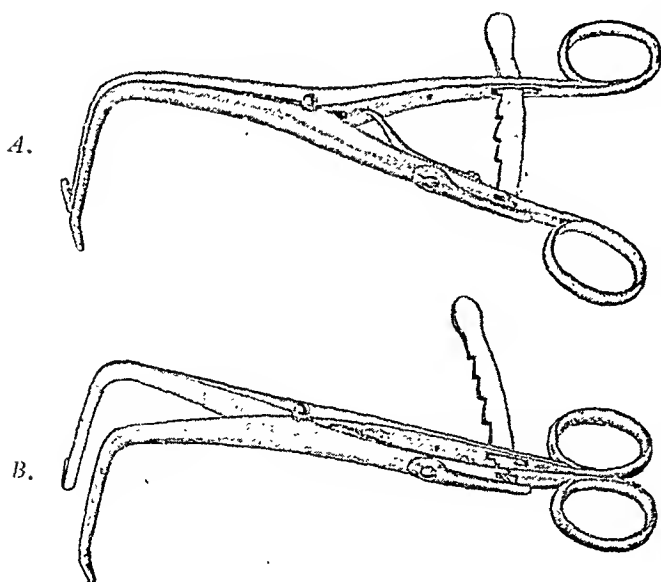
and

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THE treatment of kala-azar has now reached a comparatively satisfactory stage; thirteen years ago the death-rate in kala-azar was said to be 95 per cent. (though in our opinion it is doubtful if it was ever as high as this), whereas now, at whatever stage of the disease the patient first comes under treatment, the recovery rate should be at least 95 per cent. Many pentavalent compounds have been used; a number of these have proved satisfactory, but there is still scope for further work on this group of compounds and it is very probable that others, even more satisfactory than those at present in use, will be found. It also seems possible that some advance may be made in the methods of administering these compounds.

It is not known how the antimony acts, but it is almost certain that the action is not directly on the parasite. The largest single dose of any of the antimony compounds that is given does not amount to a 100,000th part of the body-weight of the patient, the antimony is fairly evenly distributed amongst the various organs and tissues of the body, and the concentration in any one organ, except possibly the kidneys, is unlikely to be greater than 1 in 10,000 at any time. As the antimony is very rapidly excreted, especially when given in the pentavalent form, the cumulative effect is probably not very great. On the other hand, we know that solutions of antimony compounds of 1 in 100 have no effect on the flagellate form of the parasite *in vitro*. It has been suggested that, as is the case with arsenic in the salvarsan group of compounds, the parasitotropic action of



Tracheotomy Retractor devised by the author.
A, closed; B, opened.

antimony is increased in the presence of body tissues, but Noguchi (1924) failed to show that this was the case.

It has been shown repeatedly by the senior writer and the observation has been confirmed by others (Greig and Kundu, 1925) that at the end of the comparatively short course of treatment by one of the pentavalent compounds of antimony parasites are still present in the spleen, that they may be demonstrable even at the end of a month, but that they eventually disappear without any further specific treatment.

These observations all suggest that the antimony stimulates certain of the body tissues to react and produce an environment unsuitable for the existence of leishmania, and that this reaction continues even after the antimony is excreted. Now over-stimulation usually produces paralysis, so that if this theory is correct, there is a danger that by increasing our dosage to too great an extent we shall defeat our own ends by producing paralysis where we had hoped only to produce stimulation.

Ehrlich's ideal, his *therapia magna sterilans*, was a drug with the maximum parasitotropic and the minimum organotropic action, of which one dose would have no detrimental effect on the body, but would kill all the parasites (of that species for which the drug was a specific) in the body. This ideal is much more likely to be attained with a drug which has a direct action on the parasite than with one in which the action is indirect, as is almost certainly the case with antimony in the treatment of leishmaniasis. It is much easier to imagine that steady stimulation over a period of a few weeks would produce better results than violent momentary stimulation. Presumably, it is for this reason that the usual practice of dividing the dose of the antimony compound necessary to produce a cure into 30 doses, and giving them over a period of 2 to 3 months in the case of the antimony tartrate salts, or into 10 to 12 doses and giving them over a period of about a month in the case of the pentavalent compounds, has been considered the most satisfactory. It was not, however, for this reason that the practice was adopted; most workers found that it was not satisfactory to increase the dose of sodium antimony tartrate above 0.1 gramme; some patients stood the greater dose, but on the whole signs of intolerance rapidly and frequently appeared directly this maximum was exceeded. In the same way most observers make 0.2 gramme the maximum dose for urea-stibamine.

Contrary to the above theoretical considerations, the senior writer has found in practice that more satisfactory results are obtained by concentrating the treatment as far as possible; that is to say to an extent

short of producing immediate symptoms of overdosage; and he has felt that if a compound of low toxicity could be discovered, a further concentration of the course might be beneficial, more especially in "resistant" cases.

One of the most successful compounds in the treatment of the disease in the senior writer's experience has been Neo-stibosan (No. 693), an amine salt of para-amino-phenyl stibinic acid prepared by Bayer (previously prepared by Hayden). He used this compound first more than 4 years ago, but it is only during the last year or so that he has been able to obtain sufficient supplies to give it an extensive trial. The results of the treatment of the first 61 cases were published about a year ago (Napier, 1927). The results in this series were extremely satisfactory; vomiting was, however, a prominent complication and prevented the maximum dose from being administered in one or two instances. Whilst on leave last year, the senior writer visited the factories of the Bayer-Meister-Lucius Company at Leverkusen and Elberfeld and had an opportunity of discussing this preparation with Professor Schmidt, the originator of the pentavalent compounds of antimony; by a slight modification in the method of preparing this compound without any corresponding modification in its composition Professor Schmidt has now been able to prepare a compound from which the emetic properties have been entirely eliminated. Since his return from leave the senior writer has treated more than a hundred cases, using different batches of this compound, with entirely satisfactory results; in no instance has it caused vomiting, or any other adverse symptoms. Another point of interest is the very low death-rate that has occurred. About 175 unselected patients have been treated by this compound of whom only 3 have died, a death-rate of less than 2 per cent. Most of the cases were very advanced and the condition of some of them was very precarious at the time the injections were commenced. All the adults tolerated the maximum dose of 0.3 gramme without any difficulty.

The writers felt that this compound was so particularly innocuous that it would be a suitable drug with which to attempt a further concentration of the course of treatment. Previous experience had shown that 8 injections produced a very high cure rate, so that this was adopted as the routine course. The initial dose was 0.2 gramme and each subsequent dose 0.3 gramme in the case of adults; in the case of the child weighing 26 lbs., 0.1 gramme was given throughout; other children under 50 lbs. received a maximum dose of 0.2 gramme, and those from 50 to 60 lbs., 0.25 gramme. In every case the injections were given daily, so that if they were given at the same time each day the whole

course could be finished within a period of one week (the actual time expended in giving the injection being negligible). The cases were not in any way selected, but after a certain date all patients admitted to the Carmichael Hospital for Tropical Diseases were given this concentrated course, and in only one instance was it found necessary to abandon the treatment; this was in a case in which dysentery developed after the first injection. Dysentery has not previously been associated with the administration of this compound, and the concentration of the course could not be blamed because the symptoms started after the first injection. In the first 28 cases included in this report, the above-mentioned routine course was given. Of these, 24 had received no previous treatment; details of the previous treatment of the others are given in the table.

No. 29, a patient who had previously had 2 courses of sodium antimony tartrate and two of urea-stibamine and had relapsed after each, was given over a period of 10 days 2.6 grammes in seven injections, including one dose of 0.5 gramme; after this he absconded from hospital, but returned two months later and was readmitted. In the meanwhile he had received no specific treatment, nor did he receive any during his subsequent stay in hospital. Spleen puncture and culture failed to show the presence of parasites; his condition on his final discharge is noted in the table.

No. 30 was a very unusual case. Some time ago he received a course of injections of Stibosan; during his treatment and convalescence he gained nearly 40 lbs. in weight. He remained in good health for at least a year, after which he began to get low irregular fever for some months; he also lost weight, but on admission this time he was still 30 lbs. heavier than when he was first admitted. His spleen was very hard and fibrous, quite unlike an ordinary kala-azar spleen. In the spleen puncture smear there were a very few large unusual shaped leishmania parasites. As the first course of injections made little difference to his condition, after a fortnight's interval a second course was given, in each instance the course consisting of 10 injections on 10 consecutive days. During the second course he complained of a sensation of constriction in his throat shortly after each injection, so the dose was reduced to 0.2 gramme.

RESULTS OF TREATMENT.

The table gives details of the individual cases.

The fever.—In some instances the temperature fell to normal during the course of injections, more frequently immediately they were discontinued, but in a few instances low

fever continued for some days. However, in every instance in which the fever was not already normal, there was a distinct drop at the end of the course of injections which suggested that the treatment itself helped to maintain the temperature. In some instances the fever was kept up by the presence of complications, and in a number of instances the administration of quinine brought the temperature down to normal. Five typical temperature charts are shown.

Weight.—In every instance the patient was gaining weight at the time of discharge. No. 11 shows a net loss of weight; he lost a considerable amount during the first three weeks but gained weight during the last week in hospital.

No. 16 lost $4\frac{1}{2}$ lbs. during the course of treatment, but had regained this weight before discharge. No. 30 lost weight during the first course of injections, but had recovered some of this before discharge. The rest showed a net gain in weight of varying amounts up to 21 lbs. in one instance.

The Spleen.—In every instance there was a very decided decrease in the size of the spleen. In many instances there was little or no decrease by the eighth day—when the course of injections was completed—but the spleens decreased progressively from the time the treatment was discontinued. In only 5 cases was the spleen measurably enlarged at the time of discharge, in 19 cases it was palpable only and in 6 it was not palpable.

The white blood count.—The blood count was not done as a routine measure before treatment. This is frequently as low as 2,000 per c.mm., and fairly constantly below 4,000 per c.mm. in well-developed cases. (the average of 59 cases done in this hospital some time ago was 3,624 per c.mm.). In the majority of instances the blood count done during the third week was very satisfactory, but the average of the counts done during the fourth week was above the average for normal healthy persons. Where more than one count was done, a progressive improvement was demonstrated in every instance but one.

Notes.—Although no specific treatment was given after the eighth day, most of the patients were kept in hospital for about a month in order that their progress might be observed. In most instances the general condition of the patient was distinctly improved by the eighth day; at this point an examination of the patient with reference to splenic enlargement, weight, etc., would show little progress, but in every instance a definite progressive improvement was noticeable from this time onwards.

In most instances the doses were given into the vein in a 5 per cent. solution but in one instance a 25 per cent. solution was used, and in another a 25 per cent. solution was given

into the muscles. Intramuscular injection of a 25 per cent. solution of this drug caused no local reaction, and much less pain than is usually caused by one-fifth the amount of emetin similarly given. Doses as large as 0.35 gramme were given into the deltoid muscle, but as a rule the injections were given in the gluteal region. The response to treatment

appears to be equally satisfactory, whether the injections are given intravenously or intramuscularly. No reaction occurred when a 25 per cent. solution was given intravenously, and the drug is readily soluble to this extent. It is very convenient to administer it in this strength, as a dose of 0.3 gramme requires only 1.2 c.cm. of distilled

	Caste, Sex and Age.	Day of Cessation of Fever.	Weight in Pounds.		Spleen, Inches below Costal Margin.		White Blood-Cell Counts, per c.mm.				Notes.
			Before.	On Discharge.	Before.	On Discharge.	Day of Treatment.	W. B. C.	Day of Treatment.	W. B. C.	
1	M., M., 40	10th	83	90	4½	P.	13th	6,250	26th	5,625	Relapsed after 16 injections of S.A.T. about 4 months ago. W. B. C. before treatment 2,820 per c.mm.
2	I. Ch., F., 29	10th	76	79	5½	P.	15th	5,000	26th	6,875	
3	A. I., M., 11	11th	54	56	4½	P.	13th	6,875	21st	10,625	
4	H., M., 30	7th	84½	91	7	1½	13th	3,650	23rd	5,000	
5	M., M., 14	8th	53	56	4½	P.	14th	10,000	Clinically vastly improved and gaining weight at time of discharge.
6	H., M., 17	5th	66½	79	2	Not Palp.	13th	3,960	26th	9,375	
7	H., F., 14	9th	72½	75	5	P.	18th	10,625	..	..
8	I. Ch., F., 20	6th	61	65½	1½	Not Palp.	17th	4,375	..	..
9	I. Ch., M., 10	7th	46	49	4½	P.	15th	6,250	21st	6,250	Relapsed after 16 injections of S.A.T. 6 months ago.
10	H., M., 6	9th	26½	32½	3½	P.	16th	9,375	26th	12,500	
11	H., M., 35	20th	86	82½	2	P.	17th	3,150	..	..
12	M., M., 25	7th	92½	105	8	P.	15th	8,125	..	..
13	H., M., 18	9th	85	97½	10	3	24th	8,650	Weight fell to 95½ lbs during treatment.
14	H., M., 35	9th	88	109	3½	Not Palp.	..	..	24th	10,625
15	H., M., 26	15th	68½	73½	3	P.	24th	10,250	34th	12,500	
16	H., M., 24	8th	100	100	1	Not Palp.	20th	10,625	..	..
17	H., M., 24	6th	92	103	2	Not Palp.	14th	6,735	Temperature kept up by ear trouble. Relapsed after 40 injections of S.A.T. 6 months ago. Weight fell to 57 lbs. during treatment.
18	A. I., M., 28	17th	95½	101½	3½	P.	16th	4,825	24th	6,875	
19	H., M., 12	18th	44½	56½	5	P.	22nd	7,425	28th	14,375	
20	H., M., 13	22nd	61	60½	4	P.	..	..	35th	6,250
21	H., M., 9	Afebrile	49	51½	3½	P.	14th	7,500	20th	8,750	25% solution given intravenously.
22	M., M., 25	Afebrile	89½	98½	8	P.	15th	10,000	..	..
23	H., M., 14	8th	69	71½	5½	1½	14th	5,000	27th	7,680	
24	H., M., 17	14th	72	80½	8	3	14th	7,500	30th	7,440	
25	I. Ch., F., 11	10th	41	49	8	P.	14th	9,375	30th	9,600	Intramuscular injections. One month previously had a course of 8 injections of No. 693 with little clinical improvement. Relapsed 4 times previously, see notes in text. Weight fell to 70½ lbs. during treatment. Relapsed after previous course of treatment by Stibosan, see notes in text.
26	H., F., 20	8th	65½	72	7½	Not Palp.	13th	4,688	27th	5,000	
27	H., F., 35	13th	78½	86½	7	P.	19th	5,000	25th	6,740	
28	H., M., 23	7th	96½	102	3½	P.	17th	6,250	..	..
29	H., M., 26	Febrile to 10th	73	84½	6½	P.	89th	10,625	Relapsed after previous course of treatment by Stibosan, see notes in text.
30	H., M., 30	14th	119½	111½	4	3	26th	3,750	..	..
		12th	111½	115	3	1½	17th	5,000	31st	6,875	

Abbreviations.

H. = Hindu.
M. = Mohammedan.
A.I. = Anglo-Indian.

I. Ch. = Indian Christian.
P. = Palpable but less than 1" below the costal margin.
S.A.T. = Sodium antimony tartrate.

where it is undesirable that patients should occupy beds unnecessarily long. The course of injections could be given and the patient could then be sent home to complete his convalescence.

With regard to the concentrating of the course of treatment it is obvious that it is quite a safe procedure, there is every indication that equally good results are obtained, and it seems possible that in "resistant" cases some definite advantage may be gained.

SUMMARY.

An attempt has been made to concentrate the course of treatment of kala-azar. The drug which has been used is Neo-stibosan, (No. 693), a pentavalent antimony compound of low toxicity and high curative value. Eight injections at intervals of one day have been given, so that the full course is completed within a period of a week. The results of this course of treatment in 28 cases of kala-azar have been very satisfactory and indicate that a high percentage cure-rate can be anticipated.

This drug can be given safely in a 25 per cent. solution; this makes it possible to use a small hypodermic syringe even for the maximum dose.

The drug is equally efficacious when given intramuscularly; 0.3 gramme of a 25 per cent. solution, which is isotonic with the tissues, gives rise to less pain than a similarly given injection of 0.063 gramme (1 grain) of emetin.

Our thanks are due to Dr. S. N. Bhattacharyya, M.B., House Physician to the Carmichael Hospital for Tropical Diseases for assistance in giving the injections and to the Haverro Trading Co., 15, Clive Street, Calcutta, for a generous supply of Neostibosan.

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A Mirror of Hospital Practice.

AN INTERESTING CASE OF MALARIA.

By S. M. RABBANI, M.B., B.S.,

Kampala, Uganda.

ON 11th March, 1928, I was called to see a patient, a Punjabi, aged 32, occupation—

mason in the P. W. D. At the time of examination the patient had a temperature of 104°, was restless, had a severe headache and marked bilious vomiting, so much so that not even a drop of water could be retained. He told me that the fever came on in the morning at about 10 a.m. with shivering. The spleen was just palpable. A blood film was taken and showed the presence of subtertian parasites.

The patient was a well-developed muscular person, had been for eleven years resident in Uganda and had had three previous attacks of severe malaria, the last one being in 1926. He was living in a well-ventilated newly-built pucca house outside the main town in a comparatively healthy locality. He gave no history of any venereal disease.

Treatment.—An intramuscular injection of 9 grs. of quinine bihydrochloride was given in the gluteal region, and calomel in fractional doses to stop the vomiting followed by magnesium sulphate the next morning.

12th March.—Vomiting abated; patient could take milk and soda, headache still present, had a free motion, temperature 103.8°. He was put on a diaphoretic mixture, but in the afternoon the temperature rose to 105°. Another intramuscular injection of quinine was given, and an ice bag was applied to the head.

13th March.—Headache less, patient felt somewhat better, temperature 102°. He was given 30 grs. of quinine bisulphate in mixture form, but vomited the mixture every time. Temperature in the afternoon was 103°, and another injection of quinine was given.

14th March.—Morning temperature 102.5°, another blood film was taken, but this time no parasite could be detected, nor did I find any other organism. I decided to give quinine intravenously, accordingly 7½ grs. of quinine bihydrochloride diluted with 10 c.c. of water was given intravenously. The temperature fell to 100° in the afternoon and the patient felt much better; headache disappeared.

15th March.—Morning temperature 101°, patient feeling better, had a good sleep last night, bowels moved all right. Patient was put on liquor arsenicalis with mist. cinchona co. In the afternoon I was not called to see the patient and so temperature was not taken.

16th March.—Morning temperature 102°, previous day's mixture was again ordered, but temperature in the evening shot up to 104°.

17th March.—Morning temperature 102.4°.

In the *American Journal of Tropical Medicine* 1925, Dr. Brosius had reported excellent results in the treatment of persistent cases of malaria with neosalvarsan. Accordingly, I gave 0.3 gramme of neosalvarsan

intravenously and the temperature fell to normal after 8 hours. The patient made a rapid convalescence and reported himself on duty on the 22nd.

The point about this case is the resistance of malarial fever to quinine and the rapid yielding to neosalvarsan.

A CASE OF ACUTE YELLOW ATROPHY.

By CAROL E. JAMESON, M.D.,
Missionary Medical School Hospital, Vellore, N. Arcot.

THE patient, a widow aged 55 years, entered the hospital with a chronic inflammatory mass of many years' standing and a foul smelling leukorrhœa. She had been treated elsewhere with Sulfarsenol for syphilis and we discovered a slightly positive Wassermann reaction. Cervical smear was positive for gonococci. Hysterectomy with removal of adnexa was advised, but at operation, on separation of coils of bowel from the uterus, free pus was encountered in the pelvic cavity and an extensive yellowish white slough. This was removed as far as possible with very little manipulation or contamination of the abdominal cavity and the wound was closed leaving a rubber tube drain. The patient was in excellent condition for about forty hours when her pulse became feeble and she became semicomatose. There was no distention and very little abdominal pain, but a partial suppression of urine. On treatment with glucose, fluids, and alkalis she improved very much, regained consciousness and took her food well. The urine, which was normal before operation except for a trace of albumen, was full of hyaline and granular casts, bile, acetone, and diacetic acid. The fæces were pale, straw-coloured and curdy. Jaundice and restlessness, which became at times a marked delirium, developed. The temperature went up to 103° every two or three days. Her general condition improved considerably on the ninth and tenth days. Some of the urine was passed in bed and could not be measured, but approximately thirty ounces was passed in the bed-pan during the day and this was normal except for bile and a trace of albumen. The tongue had a thick brown coating and the lips were covered with sordes. She continued after this in a typhoid state, progressively worse with a noisy delirium, alternating with a semicomatose condition until her death, the thirteenth day after operation.

Only a partial autopsy was possible. This showed the liver to be less than one-third its normal size, up against the dome of the diaphragm, and bright yellow in colour with small red spots. The consistency was moderately soft. The spleen was slightly enlarged.

Microscopic examination showed extensive fatty degeneration of the liver with the shape

and outline of the cells lost in most places, and spots of necrosis; also well marked pigmentation.

The chloroform must have been the main factor, and the syphilis possibly a contributing factor in this case of acute yellow atrophy of the liver.

A CASE OF SERIOUS VASO-MOTOR DISTURBANCE AFTER AN INJECTION.

By U. TRAVATHAM, I.M.P. (Mad.),
Physician and Surgeon, Wakema, Burma.

A YOUNG lady, aged about 20, was under my treatment for chronic gonorrhœal rheumatism. My usual treatment for such cases is to give a combined course of mixed gonococcal vaccine (Gonorgin) and contramine intramuscularly. A course of vaccine consists of six injections given twice weekly in graded doses; the contramine is given weekly, intramuscularly, about 3 times.

Contramine is an organic compound of sulphur whose composition is diethyl-anmonium-diethyl-dithio-carbamate. At present it is supplied in the form of solution for ready use, in 1 c.c. and 2 c.c. ampoules. According to the directions, I used to give 1 c.c., which is 0.125 grammes, intramuscularly, as the initial dose. I take the necessary precautions for an intramuscular injection by giving it deeply into the muscle, the needle being always inserted first to see that it is not in the blood-vessels. Then the syringe is attached to the needle with the solution and injection made slowly. The patients usually complain of little pain at the time and nothing afterwards. But the case of interest is that of the young lady above referred to. She had had about two injections of gonococcal vaccine already. I gave her one injection of contramine. I gave her the usual dose of the solution, namely, 1 c.c. intramuscularly, taking all the necessary and usual precautions. The injection was given at about 8 a.m. in my dispensary. She went home afterwards presumably quite all right.

At about 10 a.m. she took her diet as usual. Half an hour after she got suddenly giddy and began to pass three or four watery motions, spitting a lot of saliva, and passed into a state of coma.

The relatives came to me in a great hurry and explained to me what had happened. I hurried to the patient's house at once and examined the patient thoroughly. She was unconscious and her breathing was very hard. Her pulse was very slow and weak, about 50 per minute. She was sweating profusely and saliva was coming out of her mouth profusely. I was much alarmed to see the symptoms of the patient. I have never had any such experience in such a case of contramine injection. I immediately gave her 0.5 c.c. of

adrenalin hypodermically. After 15 minutes she began to improve in her condition. Her pulse improved, respirations came to normal, and consciousness revived. Her eyelids which were enormously swollen, subsided gradually.

Again I gave her 2 grains of caffein citras with a 3-minim dose of tincture of strophanthus in one ounce of water internally, about three doses once every hour.

In the evening she was completely all right except for slight giddiness.

A CASE OF MEDICO-LEGAL INTEREST.

By ATINDRA NATH SEN, M.B.,

Teacher, Medical Jurisprudence, Campbell Hospital,
Calcutta.

A HINDU male, aged about 25 years, was admitted to the cholera ward on the 29th March, 1928, in a collapsed condition. The examination of the stools revealed *Entamoeba histolytica*, but no cholera vibrios. He was transferred to the medical ward on the 30th. On the morning of the 5th April at 1 a.m. he was found lying on his bed groaning from some pain, as the patients nearby reported. At about 1-30 a.m., a white form attracted the nurse's attention and she found the patient hanging by a twisted bed sheet round his neck ligatured on the right side, from the thick wire stretched at the foot of the beds through the whole ward for suspending mosquito curtains. The limbs were all free, except the left hand which was holding the wire. The body was immediately taken down. The duration of the hanging was probably not more than 15 minutes and the drop was not more than a foot; no ligature marks were noticed by the medical officer on duty.

Post-mortem Appearances.—Eyes closed, pupils slightly dilated, tongue inside the mouth, no lividity of nails, slight whitish discharge from the urethra. Rigor mortis present. A faint ligature mark on the upper part of the left side of neck about three-quarters of an inch was noticed. The mark appeared more translucent when the skin was dissected up and seen against the light. The margins did not show any redness. No ligature marks were visible at all on the right side. The muscles and other structures showed no signs of injury. Liver, spleen, lungs and brain were all anæmic. Both the cavities of the heart were empty. The sigmoid flexure was perforated for about $1\frac{1}{2}$ by $1\frac{1}{2}$ inches, and numerous gangrenous ulcers were noticed in both the descending colon and the sigmoid flexure. Death appeared to be due to shock. Evidently this was a case of suicidal hanging at a time when the man was under shock from perforation of intestines. The interesting point is whether a person under shock, when he is about to

take his last gasp, is capable of doing such an act. At least this case shows it is quite possible.

I am greatly indebted to Major S. N. Mukherjee, F.R.C.S., Superintendent of the Campbell Hospital, for allowing me to publish this case.

COMPLETE INVERSION OF THE UTERUS.

By R. A. MURPHY, L.R.C.P. & S.I.,

Medical Officer to Tea Estates, Lusherpore Valley,
S. Sylhet.

A COOLIE woman, aged about 35; was first seen on the morning of May 4th. She had given birth to her sixth child on the early morning of May 1st, and the labour was reported to have been normal, and of short duration. The untrained *dai* insisted that there had been no traction on the cord, and this is probably correct, as the more popular method of aiding the third stage is to stuff a tress of the mother's hair into her mouth, so that the resulting vomiting will cause expulsion of the placenta. As far as the history could be ascertained, a protuberance had appeared shortly after birth, and during the day had gradually increased in size, but the husband forbade the *dai* giving information. Hæmorrhage had been negligible. On examination the whole of the uterus was found inverted, lying between the thighs, wrapped in a dirty cloth. The condition of the patient was excellent, showing no signs of shock, nor collapse. Reduction was effected under chloroform with great difficulty, and only after one and a half hours. The easy replacement as described in textbooks was not possible, and it was necessary gradually to squeeze and knead back the parts, in reverse order of the descent, Sub-assistant Surgeon Mohin C. Datta and myself alternately carrying on the somewhat trying process, while another assistant gave the anæsthetic, which last at no time gave any cause for anxiety. "E.C." lotion was liberally applied during the whole time of operation. After reduction, the vagina was packed with acriflavine gauze, and this was renewed daily until the day of discharge. No douching was done. No shock followed, and most surprisingly there was no rise of temperature later. It is remarkable that such a serious accident as inversion of the uterus could occur, and be followed by neither bleeding, shock, nor pyrexia. To the patient, the occurrence was little more than an inconvenience, and much persuasion was required to prevent her leaving hospital the following day. She eventually left on the seventh day, but has been seen since, and the uterus is normal.

Indian Medical Gazette.

AUGUST.

MYCETOMA INFECTION: AN APPEAL FOR MATERIAL.

A NEW science has arisen of recent years in tropical medicine, and is rapidly coming to the front; that of medical mycology. Many of the skin diseases of the tropics are due to infection with fungi, and recent articles by Lt.-Col. H. W. Acton, I.M.S., and his assistants, Dr. C. McGuire, Dr. Ganapati Panja and Dr. K. P. Bannerji, show how important this infection is in general medical practice in India. Cryptococcus infections are extremely prevalent in birds and animals, and have been reported in man from time to time. *Rhinosporidium seberi* is essentially an Indian disease. *Sarcocystis* infection is possibly of fungoid origin. It is possible that the mysterious Rickettsia bodies which are responsible for typhus fever, for spotted fever of the Rocky Mountains, and for the seven-day fever of Japan are of fungoid nature. Granuloma inguinale has long been suspected to be of fungoid origin. Fungi—such as *Blastocystis hominis*—frequently parasitise the intestinal tract of man, where they seem to be non-pathogenic, but are especially associated with indigestion due to starchy food-stuffs.

There is one special fungoid infection of man, however, concerning which our ideas as to causation, classification and treatment are still in a state of chaos, viz., mycetoma infection (commonly referred to as "Madura foot," though it may affect the hands also). From time to time, severe cases of this infection are reported in our columns. Yet it is clear that cases are so infrequent that no one observer within his lifetime will see a sufficient number of cases thoroughly to work out the ætiology, pathology, and treatment of this disease. Hence the present appeal.

We have previously commented in these columns on the fine work which has been carried out in the Skin Out-patient Department of the Calcutta School of Tropical Medicine, financed by the generosity of the Indian Research Fund Association. And—in response to a request by Lt.-Col. H. W. Acton, I.M.S.—we now desire to broadcast an appeal for help in studying the problems of mycetoma infection. If workers all over India will collaborate in sending in material, clinical notes, information and photographs of cases, there is very little doubt that within the course of a few years sufficient information can be collected to render a standard account of this rather rare disease possible, and to indicate the best measures of prophylaxis and treatment.

Turning to the history of the disease, Madura foot, as it has hitherto been reported in India, it is stated to be common in the following areas:

Bombay Presidency; Larkana, Sukkur, and East Khandesh.

Madras Presidency; South Kanara, Guntur, South Arcot and Ramnad.

Mysore State; in South Kanara.

Hyderabad State, Deccan; Aurangabad.

Delhi Province.

It is stated to be rare in—

Bengal; where it occurs at Pabna.

Assam; the Garo Hills, Kamrup and Sibsagar are reported to be infected.

Bihar and Orissa; in the Santhal Parganas.

Burma; in Mandalay and Sandoway.

The Punjab; where it has been reported from Karnal, Gujrat and Shahpur.

The Central Provinces; reported from Yeotmal, Bhandara, Bilaspur and Jabulpore.

The method of classification generally adopted is that of Chalmers and Archibald. This classification is followed by Brumpt, Langeron, Castellani and Chalmers and other workers in their manuals. They subdivide the mycetoma infections into two broad groups, as follows:—

(a) The actinomycoses. These are forms of mycetoma infection in which the grains are composed of fine, non-segmented mycelial filaments, in which the walls are usually not well-defined as apart from the contents, and in which chlamydo-spores are absent.

(b) The maduramycoses. In this type of infection the grains are composed of large, segmented mycelial filaments possessing well-defined walls and chlamydo-spores.

The actinomycoses are caused by organisms belonging to a genus which is usually termed the genus *Actinomyces*, though it is termed *Discomyces* by the French workers, and *Nocardia* by many British workers. These are organisms which grow in the form of a much branched mycelium, which may break up into segments that function as conidia. They are sometimes parasitic, and infect animals as well as man, the radiating threads showing prominent clubbed ends. Some are anaerobic. The following species have been isolated from cases of mycetoma infection in man:—

(i) *Actinomyces bovis* var. *harz*. Three cases in Brazil. The colour of the granules is not reported.

(ii) *Actinomyces asteroides*. From the Argentine, Europe and Brazil; the colour of the granules is not reported.

(iii) *Actinomyces convolutus*. From Khartoum; granules orange coloured.

(iv) *Actinomyces bahiensis*. From Brazil; granules yellow.

(v) *Actinomyces mexicans*; from Los Angeles; granules yellow.

(vi) *Actinomyces indicus*; from the Sudan; granules yellow.

(vii) *Actinomyces madura*; from Greece, Algiers, the Argentine and Cuba; granules white.

(viii) *Actinomyces somaliensis*; from Somaliland and the Sudan; granules yellow.

(ix) *Actinomyces yazbeb*; from Brazil; granules white.

(x) *Actinomyces pelletteri*; from Brazil, Egypt and India; granules red.

(xi) *Actinomyces verrucosus*; from Switzerland; granules white.

The above list will be sufficient to show the confusion which at present surrounds the whole subject, and one cannot help wondering whether the white, yellow, black and red strains are not possibly analogous to the different colour strains of *Tinea cruris*, and whether in fact they cannot be reduced to a common denominator on a suitable synthetic medium; whether they are not local varieties or sub-species of one and the same organism. Further, infections with *Sterigmatocystis*, *Aspergillus*, and other species are common. Are these secondary contaminating fungi, or are they pathogenic? The point remains to be worked out. Is Madura foot a clinical entity caused by several different species of fungi; or is it due to a certain genus of fungus which causes localised periostitis?

Castellani divides the actinomycoses into the following genera: (i) *Nocardia*, (ii) *Cohni-streptothrix*. The fungi of genus *Nocardia* are stated to grow best under aerobic conditions, are usually cultivated very readily, and produce arthrospores. The genus *Cohni-streptothrix* Pinoy, 1911, grows best anaerobically, is difficult to cultivate, and does not produce arthrospores. He recognises black, white or yellow, and red varieties of actinomycosis infection, with granules of corresponding colour, and then differentiates different species within these groups. The white or yellow variety of actinomycosis may thus be caused by an organism of either the *Nocardia* or *Cohni-streptothrix* groups. The red variety is due only to *Nocardia indica*.

Turning to the maduramycoses, here the grains show large, segmented mycelial filaments, possessing well-defined walls, and usually chlamydospores. Seventeen different species, belonging to different classes and genera, have been reported as causative agents. They have been classified as follows:—

Fungi imperfecta.

- Genus *Madurella*; 6 species.
- Genus *Indiella*; 3 species.
- Genus *Glenospora*; 2 species.
- Genus *Scedosporium*; 2 species.

Ascomycetes.

- Genus *Allescheria*; 1 species.
- Genus *Aspergillus*; 1 species.
- Genus *Sterigmatocystis*; 1 species.
- Genus *Penicillium*; 1 species.

Castellani again divides the maduramycoses into black, white or yellow, and red varieties, with grains of corresponding colour. According to its geographical distribution, he sub-divides the black variety into European, African, Asian and American strains. This classification seems needlessly complicated; especially since Nicolle and Pinoy have experimentally produced both black and white grains by injecting *Sterigmatocystis nidulans* into pigeons' feet. Castellani also divides the white or yellow maduramycoses into European, African and Asiatic strains.

As far as can be observed from the literature, black maduramycosis may be produced by the

different genera *Aspergillus*, *Madurella*, *Sterigmatocystis* and *Glenospora*.

* * * * *

It is obvious, from the above outline, that the whole subject of mycetoma infection in man (as also in animals) is at present in a state of confusion. Sir Aldo Castellani deserves the utmost credit for his pioneer work on the subject, which now merits fuller attention and study.

The material asked for is (a) cultures, and (b) infected tissues for section.

In cultivating, the greatest care should be taken to take cultures only from sinuses which have not been opened up previously, since open sinuses are very apt to become secondarily contaminated. If the pustule is open, the grains removed should be well washed in saline, then heated in saline at 56°C. for ten minutes to kill secondary, contaminating bacteria, and two grains planted on each tube of culture medium. At least three such cultures should be taken from each case. The media used should be either Sabouraud's Maltose Agar, which has the following composition:—

Maltose 4 per cent.
Peptone (Chassing) 1 per cent.
Agar 2.5 per cent.
Distilled water 100 c.c.

With a pH of 6; or Whey Agar. The method of preparation of this is as follows:—

Whey 250 c.c.
Peptone 5 grms.
Saccharose 7.5 grms.
Urea 3 grms.
Agar 2.5 grms.
Distilled water 250 c.c.
pH. 7.4

Wherever possible, grains should be taken from unopened pustules. The skin over the unopened pustule is first washed with absolute alcohol; then the pustule is punctured and the grains squeezed out, and after washing in saline two grains are planted on each tube of medium. This medium can be obtained from the Calcutta School of Tropical Medicine.

Three or four expressed grains should also be sent in normal saline in order to study whether actinomycoses or maduramycoses infection is present. Tissues for section should be sent in a solution of formalin, 5 per cent. in normal saline, and the sections should be cut very thin, not more than 4 to 5 mm., if possible.

* * * * *

This is the first time that we have utilized these columns in an appeal for material; but we hope that it will not be the last. The problem in question is a most interesting one: it can only be solved by the co-operation of a number of willing workers. What one man cannot hope to carry out in a single lifetime, may readily be carried out by team work by a number of helpers. We would like to express our gratitude to those who have responded to Colonel Acton's first appeal, which was privately circulated; but the problem is so big, that we invite the co-operation

of the whole medical profession in India. It only remains to add that cultures or material, case notes, photographs, etc., should be sent to Lt.-Col. H. W. Acton, I.M.S., Director, Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

CORRIGENDA.

Page 282, Col. 2, 'The Prescriber's Companion for Price Rs. 15-12, read Price Rs. 5-12.

Page 370, the third author should be B. N. Banerji and not B. N. Bagchi.

SPECIAL ARTICLE.

THE TREATMENT OF INTESTINAL AMŒBIASIS: (AN ANALYSIS OF RESULTS, AND A REVIEW OF THE LITERATURE.)

By R. KNOWLES,

LIEUT.-COL., I.M.S.,

ASST. SURGEON B. M. DAS GUPTA,

ASST. SURGEON AJIT KUMAR DUTT GUPTA,

M.B. (Cal.), D.T.M. (Bengal),

and

UMAPATI GUPTA, M.B. (Cal.), D.T.M. (Bengal).

From the Department of Protozoology, Calcutta School of Tropical Medicine.

SINCE the introduction of emetine into medical practice by Sir Leonard Rogers (1912)—following the lead given by Bardsley (1829) of Manchester, who had used the drug generally in dysentery, Tull Walsh (1891), who used it in the treatment of dysentery in Calcutta, but reported that it did not give better results than other drugs, and Vedder (1911), who tested its action on free-living amœbæ, and suggested its therapeutic use—the treatment of acute and sub-acute amœbic dysentery has become a relatively simple matter. The patient is put to bed and daily injections of emetine are given. The result in almost every case is very rapid clinical improvement; indeed, there is hardly any medicinal line of treatment which gives more immediately gratifying results; on the day of admission the patient may be in real misery; twenty-four hours later he may be in comparative comfort. On the other hand, there is ample evidence to show that, whilst this line of treatment effects a clinical cure in the vast majority of patients, it fails to eradicate the infection in some 70 per cent. or more of infected persons, and that the "cured" patient is all too liable to suffer from one or more relapses at a later period.

But there is another condition due to infection of the mucosa of the colon with *Entamœba histolytica*, and that is *chronic intestinal amœbiasis*, and the successful treatment of this condition is one of the most difficult and pressing problems in the practice of medicine in the tropics. There are so many vaunted "cures" for this condition on the market to-day, that the medical practitioner is positively embarrassed in his attempt at choice. Yet, the efficacy of any or all of them, seems very much open to question. We shall discuss the pathology of the carrier state later in this memoir, but we may here state that the trend of evidence of recent years goes to show that infection with *E. histolytica* may be of any grade of severity; it is possible that in some persons the amœba lives for only a short period in the lumen of the gut, causing no symptoms, and that the infection is speedily got rid of. In the great majority of cases, however, the parasite lives in and at the expense of the mucous membrane of the colon, and the patient's symptoms may vary from a mild carrier condition which is nearly (but not quite) symptomless, to a state of affairs in which he suffers from frequent or incessant relapses, and in which he may be tortured with dysentery for years on end.

Since the opening in 1921, of the Carmichael Hospital for Tropical Diseases (116 beds), attached to the Calcutta School of Tropical Medicine, certain routine tests have been applied to the great majority of all persons admitted; no matter what the disease from which they were suffering. Thus, thin and thick blood films are examined for blood-inhabiting protozoa; thick blood films are taken at night and examined for filarial infection; the Widal and the Wassermann reactions are performed; the total and differential leucocyte counts are observed; the agglutination reaction of the serum against the bacilli of Shiga and of Flexner is tested; and often a routine blood culture, both in glucose broth for blood-inhabiting bacteria and in N. N. N. medium for *Leishmania donovani* infection, is taken. The stools of every newly admitted patient are examined (a) in the Protozoology Department for intestinal protozoa; (b) in the Bacteriological Department for pathogenic bacteria; and (c) in the Hookworm Research Department for helminthic infections. These routine tests afford a means of making a general assessment of the patient's state of health, whilst very frequently secondary infections—for which the patient has not been primarily admitted—are discovered.

The examination of the stools in the Protozoology Department shows a general incidence of infection with *E. histolytica* of about 14 per cent. Thus in 1927, the stools of 1,030 persons were examined, once only, and *E. histolytica* infection was found in 145;

incidence 14:1 per cent. This figure, however, is perhaps higher than the true figure for carrier incidence in the population dealt with, since it includes a number of cases admitted for the treatment of actual amœbic dysentery.

The hospital records from 1921 to the end of 1923 are scanty and not too well kept. But from January 1924, a system was introduced in the Protozoology Department of keeping full laboratory records, and of detailed case sheets in the hospital, and we believe that we have now a sufficient number of observations collected for detailed analysis. These range over the period January 1924 to May 1928.

The classes of patients admitted to the hospital are chiefly—(a) Europeans from the mercantile firms in Calcutta, or European tea planters from Assam or the Dooars. These chiefly occupy the private paying "cabins," and we have been struck by the extreme frequency of chronic and relapsing amœbiasis in this class of patient. (b) Anglo-Indians, almost all of them residents of Calcutta city, and usually in rather poor economic circumstances. (c) Middle class Bengalis, chiefly clerks and artisans. Fletcher and Jepps (1924) have given a very striking account of severe and often fatal amœbic dysentery, as seen among the immigrant Indian labourers in Malaya, poverty-stricken and saturated with malaria. In such a class of patient, amœbic dysentery naturally tends to kill. Amongst our patients, however, we have only had one death, due to perforation. On the other hand, we have been very much impressed with the tremendous importance of chronic intestinal amœbiasis as a cause of sickness and invalidism, especially among the European commercial community of Calcutta city. These patients do not die (in India at least), but they have attack after attack of amœbic dysentery, prolonged absences from work, spells of sick leave to England, only to be followed by recurrence of the disease on their return to India: finally, they pass into a state of chronic ill-health and in the end are invalided Home. Indeed, in our opinion, chronic and relapsing amœbic dysentery is one of the most important problems facing the European mercantile community of Calcutta. Hence the imperative necessity of finding a true cure for the condition, if possible.

Can a chronic intestinal infection with *E. histolytica* be eradicated by drug treatment? The very abundance of the supposed "cures" for amœbiasis on the market is in itself enough to make one doubt, for it is a truism that where there are many "cures" for a disease, the true specific cure is still to seek. Throughout this paper we do not use

the term "cure" in its clinical sense. It is easy enough to rid a patient for the time being of all symptoms due to amœbic infection, but to eradicate the latent infection in his colon is quite another matter. The term "cure" throughout this paper means eradication of the infection, so that relapse shall be impossible; hence, to our regret, we shall frequently have to use the modified term "probable cure." When Ehrlich gave to the world his splendid idea of the *therapia magna sterilans*, we are afraid that he rather misled the medical profession. Even in the case of syphilis, it has been found that prolonged courses of treatment and repeated injections are necessary to eradicate the infection. In the case of protozoal infections, the case is even more difficult; the *therapia magna sterilans* for trypanosomiasis has not yet been found; to cure kala-azar, a regular course of antimony injections is necessary; to eradicate malaria, continuous administration of quinine over a sufficiently long period is essential. The *therapia magna sterilans* seems an unrealisable ideal with regard to protozoal infections; what does seem to be possible, however, is to aim at the much lower but more practicable idea of reducing the infestation to such a low level, that the patient's own natural powers of resistance will overcome the few parasites that still remain.

In searching through the literature on the subject from 1910 onwards, we have been amazed at the number and ingenuity of the treatments suggested. Disappointed with the standard remedies in general use, some workers have been driven to most unusual remedies. Thus Neubert (1913) advocated a diet of sour milk, with de-emctinised ipecacuanha. Niles (1914) treated patients by the daily administration per rectum of a pint of kerosene oil, run in slowly with the patient in the knee-elbow position. Van der Togt (1921) gives cane sugar enemata, and is satisfied with the results; but "in some cases the cure had to be repeated." Da Costa and Silva (1921) give each patient three enemata a day, one of a 2 per cent. solution of sodium sulphate, one of a 4 per cent. calcium chloride solution, one of a 1:4,000 potassium permanganate solution; together with normal saline by the mouth. Andresen (1926) makes the interesting suggestion of treating patients by the duodenal tube; a strong solution of magnesium sulphate is first given in order to flush out the gut, then a suspension of powdered ipecacuanha in warm water, then a final flushing with cold water; the duodenal tube being retained for some time lest its withdrawal should provoke vomiting. Lwoff (1925) comments on the fact that *E. histolytica* is frequently parasitised by the micro-organism known as *Spharita*. We very much doubt his statement that *Spharita* harms

the amoeba, and we have once seen *Sphærita* inside a cyst of *E. histolytica* at the mononucleate phase. He goes on actually to advocate the use of *Sphærita* in amœbic dysentery and in the carrier condition to eradicate the infection with *E. histolytica*.

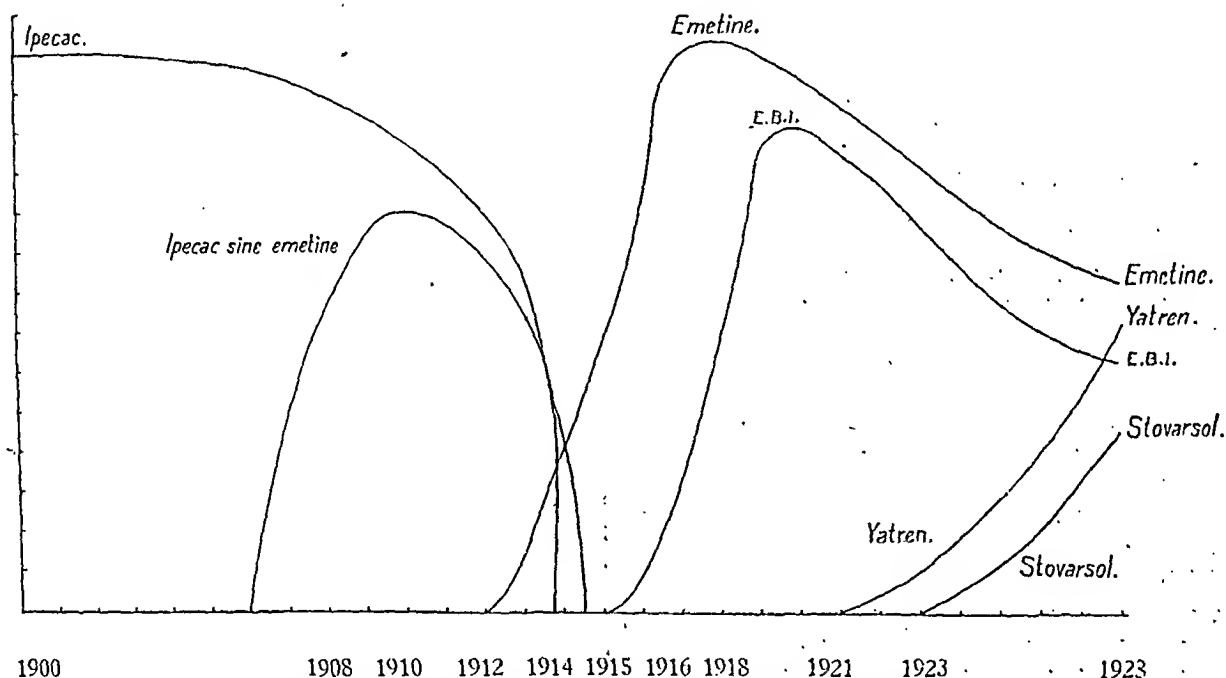
None of these methods are suitable for general out-patient or dispensary use however, and what is urgently needed in India is some cheap yet efficacious method of oral treatment.

Nothing illustrates better the tendency to follow the prevailing fashions in medical treatment than the history of the treatment of intestinal amœbiasis. Graph I illustrates

recognition of his life-saving work. At the beginning of the present century, the ipecacuanha treatment was in full swing and was used for all cases of dysentery indiscriminately, the drug being generally administered after a preliminary dose of opium, or in salol-coated pills.

Early in the present century de-emetised ipecacuanha was introduced, owing to the nauseating qualities of powdered ipecacuanha. This fashion was in vogue in 1908 when the senior author first came out to India, and was then regarded as the best method of treatment for those who could afford it. This "wave," however, did not last long.

GRAPH I.



Graph to illustrate the changes in methods of treating intestinal amœbiasis in the 20th century.

the general impression which we have gained in searching through the literature. According to Sir Leonard Rogers (1913, p. 27) the ipecacuanha treatment for dysentery dates back to 1658, and was used in India as early as 1660. It was used by Annesley and Twining in the early days of the 19th century in India, and in 1846, in relatively large doses, by Parkes. The ipecacuanha treatment then gave way to treatment by calomel and saline purgatives, the calomel being given in doses sufficient to produce salivation. Docker in 1858 appears to have been the worker who re-introduced the ipecacuanha treatment; he lost only one out of fifty patients treated among the British troops in Mauritius, and received a small pension from the Government of India in

Emetine alkaloid was first isolated by Pelletier in 1817, and was used in the treatment of dysentery by Bardsley of Manchester in 1829. In the form of emetine mercuric iodide it was employed in Calcutta by Tull Walsh in 1891, but he concluded that it did not give better results than other drugs. Vedder (1911, 1912) showed that emetine killed free-living amœbæ in dilutions of 1:100,000; and suggested the use of this alkaloid in the treatment of amœbic dysentery. This suggestion was immediately taken up by Sir Leonard Rogers (1912, 1912a, 1912b, 1913), and emetine injections rapidly became the standard treatment for intestinal amœbiasis. With the introduction of emetine, and emetine "wave" set in, and the use of powdered ipecacuanha and of de-emetised

ipecacuanha practically disappeared, though a few "die-hards" still continue to prescribe the former drug.

During the Great War it was soon ascertained that, although emetine is the ideal drug in the treatment of amœbic dysentery, yet it failed to cure the carrier condition. DuMez (1915) introduced emetine bismuthous iodide and also prepared emetine mercuric iodide, obtained promising but rather irregular results in dogs, and advocated both compounds in the treatment of intestinal amœbiasis. Dale (1916) published his first paper on the use of the double emetine and bismuth iodide in 1916, and "E. B. I." rapidly came into fashion, especially in the treatment of carriers. It appears to be the drug chiefly used to-day by British workers, though its nauseating qualities are freely admitted by almost all observers.

Yatren was first used (at Hamburg) by Mühlens and Menk (1921), and now occupies a very prominent position in the literature, despite its expense. It appears to be chiefly employed by German and Dutch workers, though Manson-Bahr and Morris (1925) and Manson-Bahr and Sayers (1927) speak very highly of it from practical experience. Whether the yatren wave has yet topped the emetine and "E. B. I." waves it is difficult to say.

Stovarsol, first introduced in the treatment of and prophylaxis against syphilis and other spirochætal infections, was first used in the treatment of intestinal amœbiasis by Marchoux (1923). Since that date, a stovarsol "wave" has set in and although it has not yet reached the popularity of yatren, the drug is steadily coming to the front. It appears to be used chiefly by the French workers, though some of the American and British workers have also reported on it.

We might have inserted other curves in Graph I for such other lines of treatment as emetine periodide, the use of the arsenobenzylic derivatives either intravenously or per rectum, auremetine, rivanol, and other compounds, but sufficient has already been said with regard to the difficulty of the position. If we may represent the medical practitioner of to-day by a vertical line drawn through the point 1928, it will be seen that when faced with the treatment of a case of chronic intestinal amœbiasis, he has a considerable variety of drugs from which to choose. A study of the literature, further, will not help him much in his decision as to which of these drugs to use, for he will find in it almost any opinion on any one of these drugs, from the faint praise which is equivalent to damnation, to the wildly optimistic reports based entirely upon clinical impressions.

Methods of Examination at Calcutta.

The 154 patients, whose cases are reported in this paper and who received in all 220 treatments, were under the treatment of the

different professors and research workers at the Calcutta School of Tropical Medicine, although the majority of the cases of actual amœbic dysentery admitted have been in the care of the senior author of this paper. Hence, since the prevailing fashions influence the doctor quite as much as the patient, several different lines of treatment have been utilised during the four and a half years reported on. The effects of the following different lines of treatment have to be recorded:—

(i) The use of the total alkaloids of ipecacuanha in the form of "Alcresta Ipecac" (Lilly & Co.); 7 cases; Table I.

(ii) The use of emetine alone, either by subcutaneous, intramuscular or intravenous injection; 32 cases; Table II.

(iii) The administration of emetine intramuscularly together with the administration of large doses of bismuth orally (Deeks' intensive bismuth treatment). This has been prescribed chiefly by the senior author of this paper in the treatment of patients infected with *E. histolytica*, and suffering from actual amœbic dysentery on admission; 55 cases; Table III.

(iv) Emetine bismuthous iodide. This has been used chiefly by Colonel Acton and the senior author in the treatment of carriers; 23 cases; Table IV.

(v) Yatren, either orally, or by the combined oral and rectal method. The majority of these patients were under Colonel Megaw's care, but a few of them were treated by the senior author; 29 cases; Table V.

(vi) Stovarsol; used chiefly in the treatment of the carrier state by the senior author; 32 cases; Table VI.

(vii) Kurchi, administered orally; used chiefly by the senior author in the treatment of patients with actual dysentery at the time of admission; 16 cases; Table VII.

(viii) The intramuscular injection of conessine or of the total alkaloids of kurchi bark; 11 cases; Table VIII.

(ix) Combinations of any two of the above methods, given simultaneously; 15 cases; Table IX.

In one instance a patient was admitted suffering from what was apparently amœbic dysentery, but no *E. histolytica* was found in the stool. He was treated by kurchi orally, but subsequently showed *E. histolytica* in his stools, and was therefore almost certainly a case of amœbic dysentery. Six patients were treated because Charcot-Leyden crystals were found in their stools, though no protozoa were seen; of these four subsequently showed *E. histolytica* in their stools, and two did not. The remaining 147 cases were all treated on account of the finding of *E. histolytica* in their stools.

It frequently happened that when a first line of treatment had proved a failure, after

a short interval the same patient was given a second or even a third—in one instance as many as six—different lines of treatment. The same patients may therefore figure in more than one of the tables. In each case, however, the stools were examined before and after each treatment, and each individual course of treatment therefore counts as one test of that treatment from the point of view of an analysis of the results.

The Question of Accuracy of Diagnosis.

All the stools of the patients concerned were examined in the Protozoology Department of the School, chiefly by the two junior authors, each of whom has acted in turn as Clinical Pathologist to the Department, though all four authors have taken part in this work. The question of accuracy of diagnosis therefore comes up for consideration. In all cases of difficulty or doubt the opinion of one or other of the two senior authors, and often of both of them, was asked.

The diagnosis of the vegetative form of *E. histolytica* in an amœbic dysenteric stool presents but little difficulty to the trained laboratory worker. The diagnosis of *E. histolytica* infection in the stool of the carrier, however, is sometimes a difficult matter. A surprising feature which comes out on a study of the tables is the great frequency with which the vegetative forms of *E. histolytica* were encountered in the stools of carriers. This may surprise workers in Europe, but we have grown accustomed to it in India. As shown by Chandler (1928) the vast majority of stools in India are not formed, but are pasty or semi-fluid, and this particularly applies to in-patients in hospital to whom saline or other aperients may have been administered. In routine work in the Protozoology Department of the School, it is rather unusual to come across a formed stool. It is this fact which accounts for the frequency with which the vegetative forms rather than the cysts of *E. histolytica* were encountered. Frequently also in such stools one comes across both the vegetative forms and the cysts together.

All stools were examined both in saline emulsion and in iodine emulsion; this being an invariable rule in the Department. We think that the diagnosis of the cysts was in all, or almost all, cases accurate; the points of identification upon which we depended were the massive chromatoid bars, the invisibility of the nuclei in saline, and the "histolytica type" of the nuclei as seen in the iodine preparation.

The chief trouble encountered is in the case of the small amœboid vegetative forms. The same difficulty has been commented on by W. M. James (1926). "It is truly remarkable,"

he writes, "to see the variations in the number of amœbæ that occur, not only in histolytica infections, but in those with the other species as well. On one day the amœbæ will occur in great numbers and are easily found. On another day, they will be uncovered only by a prolonged search in permanent preparations, and the fresh specimen will often be entirely negative." He especially advocates the examination of permanent stained preparations from every stool, in addition to examining saline emulsions. "Survey figures show that one examination uncovers about one-third of the actual number of infections present in a given community; three examinations, between one-half and two-thirds, and six examinations up to about 90 per cent.; an indefinite number of examinations may be required before the remaining 10 per cent. of infection is found. . . . "Frequently in fresh preparations, and sometimes in permanent ones, the precystic stages of *Entamoeba coli* and *Entamoeba histolytica* cannot be differentiated with certainty. In fresh specimens *Iodamoeba bütschlii*, *Entamoeba coli* and *Entamoeba histolytica* are often mistaken for one another, and small *Entamoeba nana* and *Entamoeba histolytica* organisms are very similar indeed."

Such an opinion from a very experienced worker is important, and one must confess that the vegetative forms of *Endolimax nana*, and especially of *Iodamoeba bütschlii*, present difficulties. James does not mention the use of iodine however, though he remarks: "If someone were to make a diagnosis of *E. histolytica* infection on me, I should want a fixed and stained specimen so that I might look at it and see it for myself."

In identifying these small vegetative forms of *E. histolytica*, we have relied chiefly upon (a) the characters of movement of the organism, (b) its large volume of ectoplasm, (c) the absence of ingested bacteria, (d) the invisibility of the nucleus in saline, and (e) the "histolytica type" of nucleus as seen in the iodine preparation. It is obvious from James' paper that the examination of stained preparations is very important in diagnosis; unfortunately, when one has 20 to 30 stools a day to examine as a routine measure, one rarely has time for more than the examination of the saline and iodine emulsions. We can only say that we believe the diagnosis in connection with the patients reported on in this paper to be approximately accurate. In many doubtful cases we have had a second fresh specimen sent in a bed-pan, whilst culture has frequently been resorted to.

In dealing with these different lines of treatment, we propose in each instance to give first a brief historical résumé of the results of previous workers, and then to give

our own results. The protocols will be found in the various tables.

In going through the literature we have made very free use of that invaluable journal, the tropical practitioner's vade-mecum, the *Tropical Diseases Bulletin*.

One paramount difficulty we have encountered throughout. We have tried to retain these patients in hospital for as long as possible after the cessation of treatment, in order that their stools should be frequently examined. After all treatment has ceased, two days are allowed for the elimination of the drug used from the body, and then stools are sent either every day or every other day to the laboratory for examination.

What constitutes a real test for cure (i.e., eradication) of an infection with *E. histolytica*, it is difficult to say. Malins Smith and Matthews (1917) are of opinion that in untreated cases *E. histolytica* reveals itself at examination with remarkable constancy; in 395. examinations of the stools of 20 carriers, cysts or vegetative amœbæ were encountered 129 times. Wenyon and O'Connor (1927, p. 38) state that: "The examination of a single sample from any individual for intestinal protozoa gives a result which is far from reliable. In a series of cases examined with a view to the discovery of the error, the number of *E. histolytica* infections resulting from repeated examinations was three times as great as the result obtained at the first examination."

Dobell and Low (1922, p. 1377) remark as follows on this matter: "It is the general rule that patients undergoing treatment with emetine become 'negative'—i.e., no amœbæ or cysts are discoverable in the stools—whether they are ultimately found to be rid of their infections or not. Negative examinations made during treatment are therefore of no value as a criterion of cure. This 'negative phase' may continue for some time after the administration of the drug has ceased, though the effects of the emetine usually disappear within two or three weeks of the cessation of treatment. It is, moreover, frequently impossible to discover either free amœbæ or cysts of *E. histolytica* in the stools of infected persons—even when they have not been subjected to specific treatment; in other words, the stools of untreated cases, infected with the parasite, are frequently negative. For such reasons, therefore, it is necessary to make a considerable number of examinations of the stools of any patient, and to make them at suitable times, if negative findings are to have any decisive value as an index of non-infection.

"In dealing with a few cases only, the stools may be examined microscopically every day after treatment; and if they remain consistently negative for three weeks, the chances

are that the patient has been permanently freed of his infection. The parasites rarely re-appear in the stools after such a period—if the examinations have been made daily, and by a competent and careful protozoologist. In practice, examination of the stools every few days for a period of about a month after treatment is usually sufficient to establish with considerable probability—if all examinations have been negative—that the patient has been cured..... Six negative examinations made in three weeks should be regarded as the irreducible minimum required before one even ventures to speak of a 'cure' having been effected."

It is precisely in this matter that we have encountered the greatest difficulty. The moment the treatment is over, the patient, having recovered from his symptoms, refuses to stay in hospital. It is usually possible to get one or two stools after the termination of treatment, but by that time the patient has usually left hospital and no more stools are procurable. Even in the case of European patients, it is extremely difficult to secure the samples week by week after the cessation of treatment, for the patient, having recovered from his symptoms, will not take the trouble to send specimens to the laboratory. Dobell and Low's criterion of six negative examinations in three weeks is very difficult to secure. Occasionally a careful patient, interested in his own case, and really desirous of knowing whether the infection is or is not eradicated, can be induced to send a specimen once a week for eight weeks, but such patients are the rare exception and not the rule.

Donaldson, Clark and McLean (1918) advise that "at least five examinations ought to be made in cases of amœbic dysentery." We have been particularly unfortunate in this matter; in reality the testing of any supposed "cure" for amœbiasis should be tried out in the army or in jails or other institutions where the patients can be followed up for some considerable time after the cessation of treatment, and the necessary samples obtained for examination; and we would appeal to those who are in a position to do so to carry out tests on such material. Here we can only give our own imperfect results.

It is necessary, however, to establish some standard test and to stick to it. Accordingly we may adopt the following terms:—

(a) "*Failures of treatment.*"—If either the vegetative or the encysted form of *E. histolytica* be found in the stools after the cessation of all treatment, it is clear that the infection has not been eradicated; such cases we may term "failures of treatment."

(b) "*Probable cures.*"—These are cases in which the examination of five or more stools after the cessation of all treatment has failed to show any form of *E. histolytica*. It

TABLE I.
Alcresta Ipecac.

No.	Name.	Caste.	Sex.	Age.	Disease for which admitted.	Previous intestinal history.	Previous treatment.	Findings in stool on admission.	Treatment.	Findings in stool after treatment.	REMARKS.
1.	P. C. D.	H.	M.	38	Colitis	Diarrhoea for 4 months with much abdominal colic.	9 injections of conessine.	<i>E. histolytica</i> : veg. and cysts.	2 tabs. daily, 10 days.	7 examinations. Negative.	
2.	O. A. C.	Jew	M.	48	Dysentery, relapse.*	Previous attack the year before.	Emetine injections.	Veg. <i>E. histolytica</i> .	2 tabs. daily, 10 days.	5 examinations. <i>E. histolytica</i> cysts at 5th examination.	Then put on "E. B. I."
3.	J. W. C.	A. I.	M.	39	Chronic amoebiasis.	....	Previous courses of conessine and emetine.	Veg. <i>E. histolytica</i> . <i>Giardia</i> cysts.	4 tabs. daily, 10 days.	1 examination. Veg. <i>E. histolytica</i> .	
4.	A. E. M.	E.	M.	42	Gastric ulcer	Prolonged history of abdominal pain, 7 years. Mucus frequently in the stools.	....	Veg. <i>E. histolytica</i> . C. L. crystals.	4 tabs. daily, 10 days.	1 examination. Veg. <i>E. histolytica</i> .	
5.	E. W. B.	A. I.	M.	43	Tabes dorsalis	Dysentery 5 years previously.	....	Veg. <i>E. histolytica</i> . <i>E. coli</i> cysts.	3 tabs. daily, 10 days.	16 examinations in 2 months. Negative.	
6.	H. G. L.	A. I.	M.	42	Filarial lymphangitis.	Mild attack of dysentery, 13 years previously.	....	<i>E. histolytica</i> cysts.	3 tabs. daily, 10 days.	5 examinations. <i>E. histolytica</i> cysts + at 4th and 5th.	Then put on kurchi alkaloids.
7.	Mr. R.	E.	M.	32	Dysentery.	....	Emetine injections 9 grs. with bisnuth.	<i>E. histolytica</i> cysts.	4 tabs. daily, 10 days.	5 examinations. Negative.	

* Note.—Throughout the Tables the sign * means that the patient was passing blood at the time of admission, i.e., a condition of actual dysentery was present.

is very far from certain that all such cases have really been cured, but the chances appear to be on the side of a favourable prognosis at least, for the future.

(c) "*Indeterminate cases.*"—These are cases where less than five stools have been secured for examination after the cessation of all treatment, but in which those that have been examined have given negative results. It is impossible to say whether such cases will or will not relapse. Unfortunately, the bulk of our cases fall into this "indeterminate" group. It is for this reason that it has taken us so many years of work before we considered that we had accumulated a sufficiently large series of observations to warrant publication.

With so much by way of preliminary, we may pass to the consideration of the different lines of treatment tried.

I. ALCRESTA IPECAC. (LILLY & CO.)

Historical.—The makers state that "Aleresta Ipecac." is a product in which the total alkaloids of ipecacuanha bark are adsorbed with Fuller's earth, each tablet containing the total alkaloids from 10 grains of ipecacuanha, U. S. P. The dosage advocated in amoebic dysentery is 2 or 3 tablets three times a day. The retail price in India is Rs. 4 per bottle of 40 tablets.

We have not been able to find many papers in the literature dealing with this preparation. Allan (1916), as the result of observations on 10 cases, came to the conclusion that the results are unsatisfactory on account of the variation in absorption from the intestinal tract, and claims that emetine given hypodermically is twice as efficacious. Stephens and Mackinnon (1917) used the preparation in 81 cases, all carriers. Their paper is a particularly valuable one on account of the detailed following up of the patients and the repeated examination of the stools after treatment. Of the 81 cases, 13 left hospital immediately after treatment and could not be followed up; 12 had not completed treatment when the report was written; 38 had apparently been freed from infection and had not relapsed up to periods of 3 to 7 weeks after the completion of treatment; 14 relapsed, but of these, 4 subsequently cleared up after a second or third treatment; 4 were definite failures of treatment. "Our results," they write, "compare very favourably with those obtained by the injection of emetine hydrochloride." Macgregor and Frew (1922) treated 15 cases by alcresta ipecac. given orally in doses of 30 grains a day, combined with daily injections of emetine. The cases were all examples of old standing chronic infections, and in only 2 of the cases could the results be considered permanently satisfactory.

Results in Calcutta. In all we have treated 7 patients with Alcresta Ipecac. The results are shown in Table I. Of these, 1 showed blood in the stool at the time of admission, 3 were cases of chronic amoebic colitis, and the other 3 were carriers only.

The results are:—

Cases treated,	7.
Probable cures,	3 (Nos. 1, 5, and 7).
Failures of treatment,	4 (Nos. 2, 3, 4, and 6).

These results are very unsatisfactory. The general findings may be expressed, perhaps, in terms of positive and negative stool examinations, as a measure of the degree of reduction of

the parasite numbers by treatment. Before treatment 7 stools were positive; after treatment, out of 40 stools examined, 35 were negative and 5 positive. The ratio of probable cures to failures is 1 : 1.3, and the ratio of positive to negative stools after treatment is 1 : 7.

It is clear that Alcresta Ipecac. will occasionally eradicate an infection with *E. histolytica*: Case 1 of Table I yielded 7 negative examinations after treatment, and Case 5 of the table—a carrier—was almost certainly cured. On the other hand, the results are usually disappointing, whilst the preparation is too expensive for dispensary use in India. The retail price of a bottle of 40 tablets on the Indian market is Rs. 4; the cost of treating these seven cases therefore works out at an average cost of Rs. 3-2-4 per patient. On the other hand, there are certain points in favour of the preparation; the drug is well tolerated, and its administration is not followed by nausea or vomiting, as with emetine bismuth iodide. We have usually prescribed it the last thing at night, as an alternative to emetine bismuth iodide. It is a suitable preparation for the private and paying patient.

II. EMETINE INJECTIONS ONLY, AND NOT ACCOMPANIED BY ANY OTHER TREATMENT.

Historical.—The literature on the treatment of amoebiasis by injections of emetine is so enormous that we cannot do more here than mention only the most important of the papers. Very many—perhaps the majority—of the published papers on emetine have very little value, since patients have not been followed up, and stools not examined after the cessation of treatment. The general consensus of opinion amongst the more careful observers appears to be that, whilst there is hardly any line of medicinal treatment which gives more immediate and more striking clinical results in the treatment of amoebic dysentery, yet emetine injections appear to fail to eradicate the infection with *E. histolytica* in quite the majority of patients.

The alkaloid emetine was first isolated by Pelletier in 1817. According to Sir Leonard Rogers (1913, p. 29) it was used by Bardsley of Manchester in 1829, who reported favourably on it. Tull Walsh (1891) gave it orally in the form of mercuric emetine iodide in Calcutta, but concluded that it did not give better results than other drugs. Vedder (1911) found that it was a powerful amoebicide against free-living amoebae, killing them in a solution of 1 : 100,000. He further found that de-emetised ipecacuanha is without action on amoebae. In 1912 he claimed that the emetic action of ipecacuanha is chiefly due to its cephaëlin, not to emetine, and suggested the use of emetine in amoebic dysentery. Lyons (1912) working independently failed to find that ipecacuanha has any effect on free-living amoebae, but on analysis of one of the samples used, found that it had only one-fifth of the total alkaloids demanded by the U. S. Pharmacopeia. Wherry (1912) found emetine to be lethal in dilutions up to 1 : 200,000 to free-living amoebae at body temperature, if the exposure given is sufficiently long.

In the meantime, Sir Leonard Rogers had for many years been a strong advocate of ipecacuanha in the treatment of amoebic dysentery and hepatitis, and in June 1912 he reported on 2 cases of severe amoebic dysentery and 1 of acute hepatitis cured by emetine.

The introduction of emetine therapy, indeed, is one of Sir Leonard's greatest contributions to tropical medicine.

The literature on emetine rapidly became enormous, and several papers by Rogers and other authors followed. These earlier papers are summarised by Vedder (1914) in a paper with a full bibliography. He quotes 110 cases of dysentery treated, with 99 cures and 11 deaths, and 16 cases of amœbic hepatitis, all cured by emetine. Rogers (1912a) contrasted the extremely rapid and effective action of emetine with the much less certain and less satisfactory results with ipecacuanha, and later in the same year (Rogers, 1912b) recorded a fatal case of gangrenous amœbic dysentery, where emetine had been given, and where prolonged microscopic examination of the scrapings from the ulcers failed to show any amœbæ, whilst sections of the gut wall also showed no parasites. It was soon established that the hypodermic administration of emetine is the most certain, rapid and efficacious line of treatment in amœbic dysentery and hepatitis.

On the other hand, whilst clinical results* were eminently satisfactory, and whilst emetine came into universal use (and is to-day undoubtedly the best line of treatment for a condition of actual dysentery due to infection with *E. histolytica*), doubts began to arise in the minds of careful workers as to the permanency of the cure. Thus, Baermann and Heinemann (1913) comment on the fact that after an interval of 10 days or so from the cessation of treatment, the amœbæ tend to reappear in the stools, although the patients remain in good health. Walker (1913) writes, "None of the 20 experimentally infected, or of the 9 naturally infected men has ceased to be a 'carrier' of the *Entamoeba histolytica*, although some of them have been under observation for over 2 years." Vedder (1914) notes that the infection may often not be eradicated, and suggests irrigations of quinine or of silver nitrate for the carrier state. Emetine, he remarks, is without effect in bacillary dysentery; it is also toxic, and too large doses should not be employed.

Whitmore (1914) reported a trial of emetine in 34 cases of dysentery. He notes that relapses after apparent cure are not uncommon, and draws attention to the danger of failing to recognise cases of mixed bacillary and amœbic infection, illustrating this point with notes of three such cases. Willets (1914) says that 4 cover-glass preparations should be examined and be found to be negative at each of 3 examinations of the feces after the cessation of treatment before a case may be said to be free from entamœbæ. Ipecacuanha, he notes, may be superior to emetine in finally exterminating the infection.

From this point onwards we may perhaps consider only the more important papers, and especially those in which the test for cure consisted in repeated examination of the stools after the cessation of treatment. Phillips (1914) emphasises that no patient should be considered cured until after several examinations no cysts of *E. histolytica* have been found in the feces. Emetine often fails to eradicate the infection; and after a course of emetine, a course of treatment with calomel and thymol is advocated to eradicate the residual infection. Sandwith (1914) in the Lettsomian lectures on dysentery advocates large doses of bismuth as a subsidiary measure, and records fatalities in spite of emetine treatment. Chalmers and Archibald (1915) draw attention to cases of infection of prolonged duration—up to three years or more—without noticeable diarrhoeic attacks; they advocate repeated courses of emetine at suitable intervals. Barlow (1915) with an experience of treatment of over 300 cases, notes that 75 patients who were treated for only 3 to 6 days with emetine all relapsed. On the other hand, the administration of emetine should not be continued for more than 2 to 4 weeks; the ill-effects of the drug are seen after prolonged treatment, rather than with large doses. He advocates following up the emetine injections with a course of ipecacuanha orally, and subsequent examination of the stools once a month. Low (1915) comments on the small residuum of cases which prove to be refractory to emetine

treatment. J. G. and D. Thomson (1916) advocate half a grain of emetine hypodermically each night and morning until a total of 7 to 10 grains has been given, whilst saline aperients are given at the same time. Insufficient treatment they consider dangerous as it converts the patient into a carrier. Dobell (1916) notes that the infection was not eradicated in 14 out of 21 patients to whom a course of from 12 to 14 grains was given; in the remaining 7, examination of the stools gave negative results for 2 to 3 weeks after the cessation of treatment.

A very important memoir on the subject, and one which should be read in the original by all interested in it, is Dobell's report to the Medical Research Committee (Dobell, 1917). He points out that after a course of emetine injections there is an after-phase during which the stools may continue to be negative up to 3 weeks, before cysts reappear in them. Thus the value of early negative findings after treatment is far less than that of consistently negative findings some weeks or months after the cessation of treatment. He gives the following table of results after full emetine treatment:—

Number of treatments	..	74.
Number of cures	..	15, or 20.27 per cent.
Number of doubtful cures	..	7, or 9.46 per cent.
Number of certain failures	..	52, or 70.27 per cent.

His conclusions with regard to emetine are as follows:—

(i) Emetine hydrochloride administered hypodermically in small quantities (less than 10 grains in total amount) very rarely rids a carrier of *E. histolytica* of his infection.

(ii) Full courses of the drug (10 to 12 grains or more) are successful in about one-third only of the cases treated.

(iii) Re-treatment—with equal or larger amounts of the drug—of patients who have already received full courses of treatment offers little hope of success.

A most instructive paper is one by Jepps (1916), who gives full protocols in tabular form. Of 23 persons treated, from 5 to 14 examinations of the stools after treatment showed only 7 apparently permanent cures. After the injection of at least 10 grains of emetine, 12 out of 21 cases were certainly not permanently freed from *E. histolytica* infection. Manté (1916) notes that 6 per cent. of patients still show cysts after a course of treatment; a rectal irrigation with iodine 1 gramme, and potassium iodide 2 grammes in a litre of water should be given and the stools be examined the next day; this will often lead to the finding of cysts where previous examinations have had negative results. Job and Hirtzmann (1916) found that 28 per cent. of convalescents who had had one or more courses of emetine still showed cysts in their stools.

An exhaustive report is that by Carter, Mackinnon, Matthews, and Malins Smith (1917) on the protozoological findings in 910 cases of dysentery examined at the Liverpool School of Tropical Medicine. Up to 6 examinations are necessary to reveal all carriers. Craig (1917) writes, "It is not believed that anywhere in the world has emetine been more thoroughly and extensively used in the treatment of this disease than it has in Base Hospital No. 2. Not only has a single course of 12 grains been given, as advocated, but this course has been repeated in not a few instances, but despite this thorough treatment no less than 65 of 115 patients treated at Base Hospital No. 2 developed cysts of *Entamoeba histolytica* and became 'convalescent carriers' of the disease. The treatment of these carriers with the same drug has resulted in curing but 4 cases that have been observed for as long as 2 months since the cessation of treatment, or slightly over 6 per cent. . . . The fact that following treatment with emetine the motile forms and cysts may disappear from the stools within a short period of time, is no proof that the infection is really cured, for examinations made at a later date often result positively." (Seven illustrative cases of this state of affairs are given.) "The

drug has a wonderful effect upon the acute symptoms of the disease, causing them to disappear in most instances within a few days after its administration, but, even when given until toxic symptoms appear, it does not actually cure the infection or prevent 'carriers,' save in a very few instances."

Wenyon and O'Connor (1917) advocate a 12-day combined emetine treatment, consisting of 1 grain a day by injection *plus* half a grain orally. They give the following tabulated results:—

		Emetine, 1 gr. a day by injection.	Emetine, 1 gr. a day by month.	Emetine, 1 gr. a day by injection; $\frac{1}{2}$ gr. a day by month.
Carrier cases cured.	37	6	30	
Carrier cases relapsed.	10	2	0	
Carrier cases no reaction.	5	1	0	
Acute cases cured.	0	0	2	
Acute cases relapsed.	6	2	5	
Acute cases no reaction.	0	1	0	

The authors contrast the much better results of this treatment for the carrier state than for actual dysentery.

Carter, Mackinnon, Matthews and Malins Smith (1917a), in their second report, comment on the use of methyl emetine; of 6 cases treated with 1 grain daily for 15 days, in only 1 was the infection eradicated, as judged by subsequent stool examinations. Savage and Young (1917) record the results of several different lines of treatment, the test for cure being absence of parasites from the stools for 3 weeks after the cessation of treatment. Nineteen patients were treated by emetine injections alone: of whom 7 relapsed and 3 proved to be failures of treatment. Seven were treated with emetine injections and pulv. *ipecaacuanha*: of whom 1 relapsed. Four were treated by emetine given both orally and hypodermically: of whom none relapsed. MacAdam (1918) studied the problem in Mesopotamia. Twenty known carrier cases were followed up after treatment and discharge from hospital; at the first stool examination 10 were found to be still positive; and after seven consecutive stool examinations only 3 out of the 20 had remained negative. Of 195 men recently discharged from hospital after treatment for dysentery, 38 or 19.4 per cent. were found to be carriers. The attempt to "clear" carriers seems to be a hopeless one. The same author (MacAdam, 1919) reports further on the combined treatment with emetine hypodermically and orally. Eighty cases were treated, each for 12 days with 1 grain of emetine hypodermically and half a grain orally. The stools were then examined on 26 days for a period of from 6 to 8 weeks, and in 71 of the cases the further progress was followed up for from 6 to 9 months. Of the 80 cases, 62 were cured and 18 relapsed, mostly within 4 weeks of the cessation of treatment. He speaks very highly of the combined treatment.

A most important memoir on the subject is that by Gunn and Savage (1919), who worked at Alexandria. The stools of all patients were examined from 4 to 7 times weekly after the cessation of treatment. The patients fell into the following series:—

(a) Daily injections of emetine; 21 cases; 4 of acute dysentery, 1 cured; 17 carriers, 11 cured.

(b) Emetine bismuth iodide, gr. iii orally daily for 12 days. 24 cases; 10 acute, of whom 4 were cured; 14 carriers, of whom 9 were cured.

(c) Emetine gr. i by injection daily, *plus* emetine bismuth iodide gr. iii orally at night; for 12 days: 12 cases; 5 acute cases cured and 1 relapsed; 6 carriers, all cured.

The authors consider this the most satisfactory line of treatment, but remark that it is rather "rough" on

the patients who become weak, depressed, and emaciated.

(d) Emetine gr. i daily by injection, *plus* 10 grains of *ipecaacuanha* daily in pill form. 16 cases; 4 acute cases, of whom 2 were cured; 12 carriers, none cured.

(e) Emetine gr. i daily by injection for 12 days, followed by oral administration daily of emetine bismuth iodide gr. ii for 14 days. 58 out of 68 carriers cured.

(f) Emetine gr. i by injection daily for 12 days, followed by oral administration of emetine bismuth iodide gr. iii daily, for 14 days. 103 out of 122 carriers cured. This is the line of treatment finally recommended by the authors whose paper is one of the most important in the whole literature.

Brug (1919) considers 7 examinations during a month after cessation of treatment a criterion for cure, but records disappointing results with emetine in Batavia. Of 19 cases of infection in Europeans only 4 were cured, and 6 out of 12 cases among Javanese patients. MacAdam (1919) considers that at least one-third of the men returned from the war fronts to the convalescent depot at Deolali were *E. histolytica* carriers; he considers the suggestion of treating all carriers in the army an impracticable one. Of 80 cases of infection studied, 36 were chronic dysenteries with a history of more than 6 months' duration, and with two or more relapses. Thirty per cent. of patients treated showed signs of persistent infection within 6 weeks of completion of treatment, and 8 out of 36 persistent carriers reported an acute relapse within 6 months of completion of treatment. Carriers without symptoms proved easier to cure; in only 4 out of 32 such cases did the infection persist.

Fletcher (1922) records an interesting point. During the first 6 months of 1921, experience at Kuala-Lumpur seemed to indicate that emetine was not active in amoebic dysentery, but in July 1921, fresh preparations of emetine were made up in the laboratory, and with these the subsequent results were uniformly good. Some of these patients died from other diseases and in these at post-mortem it was found that the healing of the amoebic ulcers was taking place "with almost magical rapidity."

Hage (1923), working on the personnel of the German navy after the war, reports that energetic treatment with emetine during the acute stage appeared in no way to minimize the liability of the patient to become a carrier. Willmore (1923) has an important memoir on a large series of cases treated at the Ministry of Pensions' Hospital, all of them diagnosed microscopically. His practice is to give 20 grains of emetine and 60 grains of emetine bismuth iodide in 20 days. Of 358 cases so treated—

99 were presumably cured after the first course 28 per cent.
259 relapsed 72 per cent.

(2) Of these 259 relapse cases, 183 received a second course—

36 were presumably cured 20 per cent.
147 relapsed 80 per cent.

(3) Of these 147 relapse cases, 59 received a third course—

3 were presumably cured 5 per cent.
56 relapsed 95 per cent.

(4) Of these 56 relapse cases, 26 received a fourth course, 8 of them a fifth course, and 7 of the last a sixth course; all relapsed. The author concludes that neither emetine nor emetine bismuth iodide is a specific cure for amoebiasis. *Ipecaacuanha* in bolus or cachets, and *alcresta ipeacac.* proved still more disappointing; and the author advocates supplementing hypodermic or oral medication by rectal irrigations of emetine base suspended in olive oil with the aid of ether.

Oliver (1924) reports on 292 cases of amoebic dysentery treated at Basra. The patients were given an early morning saline aperient, gr. i of emetine hypodermically, and gr. $\frac{1}{2}$ of emetine orally every day for 12 days. Seventy-eight per cent. of cases still showed cysts after treatment, and emetine *per se* must be looked upon as a total failure in eradicating the infection. The presence

of malaria as a complication made matters even worse, and the task of eradicating an amœbic infection in a patient debilitated by malaria appeared almost hopeless. Mixed infections were common, and the *B. dysenteriae* were isolated from 21 of the cases. The author observes that emetine treatment appears to be much more successful in the warm weather than in the cold. The combination of salol in liquid paraffin with emetine treatment gave better results; 11.2 per cent. only of 53 uncomplicated cases so treated were found to pass cysts after cessation of treatment.

Petzetakis (1924) advises the administration of emetine intravenously. In the treatment of acute cases a course of 7 such injections is given; then 20 to 30 days later a second course of 5 or 6 injections, given on alternate days; later, within 1 year of the attack, 3 further courses, making 5 courses in all during the year. During the next two years 2 or 3 further courses are advised. In chronic cases he records that surprisingly good results are obtained, and sometimes eradication of the infection. Calcium chloride intravenously is also advocated as a supplementary treatment.

Traviagino and Soedjono (1924) report on the treatment of some 350 cases in Java. They place yatren first in order of therapeutic efficacy, emetine second, and emetine bismuth iodide third. Sellards and Leiva (1923) have shown that the hyperacute amœbic dysentery which results in kittens from inoculation per rectum with infective material can be cured by rectal administration of emetine at a dose of 20 mgm. per kilo. In man they consider that recovery from amœbic dysentery results from two factors: (a) the natural resistance of the host, and (b) a moderately toxic action of emetine on the entamœbæ.

A very full investigation is reported by P. W. Brown (1926). There were 153 cases with active dysentery or liver abscess; 258 cases with diarrhoea and similar abdominal complaints; and 122 carriers without symptoms. A study of gastric test meals showed that chronic diarrhoea in infections with *E. histolytica* may be associated with achlorhydria, and administration of dilute hydrochloric acid may be a useful measure. "To establish a cure," he writes, "is very difficult; repeated examinations of stools must be made over a period of months, and reinfection must be prevented. Ipecacuanha or its derivatives are effective in only 58 or 70 per cent. of cases. Emetine and arspicuanin form a useful combination. With the resistant case, persist rather than temporize. The parasite can eventually be eradicated."

Dobell and Laidlaw (1926) in a very important memoir report on the action of emetine *in vitro* on *Entamoeba histolytica* in culture. Their conclusions are as follows:—

(1) Emetine and cephaeline have been found to be specific poisons for *Entamoeba histolytica* under cultural conditions.

For the amœba (in culture) these alkaloids are at least 50 times as poisonous as isoemetine, psychotrine, methylpsychotrine, demethoxymetine, or noremetine.

For this species also emetine has been found to be about 10 times as poisonous as stovarsol, and about 50 times as poisonous as quinine—under identical conditions of experiment.

(2) *Entamoeba coli*, *Entamoeba gingivalis*, and *Endolimax nana* have been found comparatively insensitive to the presence of emetine in cultures—*E. coli* being able to withstand a concentration of the alkaloid at least 100 times that which is lethal to *E. histolytica*.

(3) The effects of solutions of emetine on *E. histolytica* are peculiar. Very strong concentrations (1 per cent. or more) are needed to kill this parasite instantaneously, but only very weak solutions (1 in 50,000 or less) are necessary to kill it if allowed to act for a sufficient time.

(4) In view of these findings it is concluded that the curative effects of emetine in human amœbic dysentery are best explained as a result of the direct lethal action of the alkaloid on *E. histolytica*.

Drake-Brockman (1926) notes that pushing the use of ipecacuanha and its derivatives to excess, renders the

amœbæ emetine-fast. Courses of treatment should, therefore, be given at intervals, notwithstanding the presence of entamœbæ in the stools. Between the courses, yatren or kurchi may be given. In some cases benefit follows the use of massive doses of bismuth. In out-patients good results were obtained by the use of bismuth subnitras, gr. 30, combined with sodæ bicarbonas, gr. 10, given t.i.d.; later, doubling the bismuth and continuing the treatment for 3 or 4 months with pulv. ipecac. radix in 10 to 20 grain doses in a cachet at bedtime for the first month or two only. When the lesions are in the cæcum or high up the colon, no drug can at present replace ipecacuanha and its derivatives.

Young and Tudhope (1926) describe the pathology of prolonged emetine administration in man and in experimental animals. Comparing the findings in rabbits with a man of 12 stones weight, 11 doses of 1.9 grains would prove fatal, and 35 doses of 0.8 grains would be distinctly risky. Not more than 1 grain should be given in the 24 hours, and not more than 12 grains in a course. The patient should be kept as completely at rest as possible, owing to the toxic action of emetine on the heart muscle; exercise whilst under treatment is directly contra-indicated. Newman and Davies (1926) also emphasise the dangers of emetine therapy on the heart; a course of 12 to 15 grains should not be exceeded. Stovarsol is nearly as efficacious as emetine, and a combination of the two drugs may eventually prove to be the best method of treatment.

Schur (1927) stresses his almost unfailingly good results with emetine therapy in ulcerative colitis. These cases are in fact amœbic, though it may sometimes be difficult to demonstrate the amœbæ in their stools. He gives the emetine in small divided doses—0.02 gramme 3 times a day subcutaneously. In this dosage, no toxic or harmful results have been detected. Together with emetine therapy he insists on the necessity for daily irrigation of the colon with mild astringents. van Steenis (1927) states that hypodermic injections of emetine are still indispensable in the treatment of amœbic dysentery; dose 30 to 60 mgm. daily on 5 consecutive days, not more than once a month. Houssiau and Duwez (1927) claim that emetine, given alone, is a sufficient and effective cure for amœbic dysentery, if given from the first onset of the disease. It has little or no effect on the carrier state, and in such cases emetine treatment should be combined with stovarsol or yatren administration.

In summing up the above series of papers, the general consensus of opinion appears to be (a) that emetine injections are by far the most satisfactory immediate line of treatment for amœbic dysentery, but (b) that emetine therapy is generally a failure in the treatment of the carrier condition. It has been shown by S. P. James (1926) that primary malaria, as therapeutically induced in the treatment of general paralysis of the insane, is a disease which is very readily amenable to quinine treatment; only a few days of quinine treatment are necessary to effect a cure without relapses. On the other hand, the experience of all workers in the tropics is that established and relapsing malaria is very difficult to eradicate. Possibly a similar state of affairs exists with regard to amœbic infection; the prospects of eradicating the infection by emetine therapy may be much better in patients seen when suffering from their first attack of amœbic dysentery, than in cases where the infection has become a chronic and established one.

RESULTS IN CALCUTTA.

Thirty-two patients were treated by injections of emetine only, unaccompanied by any other form of treatment. Details are given in Table II. Seven of these patients had blood in the stools on admission; 17 were cases of chronic amœbiasis; and 8 were

TABLE II.
Emetine Hypodermically.

					Disease for which	Dysentery, intestinal	Previous treat.	Findings in stool		Findings in stool + at 3rd examination. Veg. <i>E. coli</i> .	concessine and "E. B. I."
25.	H. K. P.	H.	M.	30	Dysentery (relapse).	Dysentery: (a) 2 years before; (b) 8 months before.	(a) Emetine and stovarsol. (b) Yatren per rectum.	Veg. <i>E. histolytica</i> . C. L. crystals.	Emetine 6 grs. in 6 days.	5 examinations. Veg. <i>E. histolytica</i> + at 5th examination.	After failure of concessine. Then put on kurchi.
26.	J. W. C.	A. I.	M.	39	Colitis	....	....	Veg. <i>E. histolytica</i> . <i>Giardia</i> cysts. C. L. crystals.	Emetine 6 grs. in 6 days.	3 examinations. Veg. <i>E. histolytica</i> + at each. <i>E. histolytica</i> cysts. <i>E. coli</i> cysts. <i>Giardia</i> cysts.	Then put on alcresta ipecac.
27.	M. E. D.	E.	F.	37	Dysentery *	....	....	Veg. <i>E. histolytica</i> .	Emetine 9 grs. in 12 days.	3 examinations. Negative. <i>Chilomastix</i> cysts.	
28.	Mr. L.	E.	M.	44	Colitis	Dysentery 2 years previously with occasional relapses.	Course of 12 emetine injections. Dimol.	Veg. <i>E. histolytica</i> .	Emetine 9 grs. in 9 days. Potass. citrate orally.	5 examinations in 4 weeks. Negative.	
29.	H. G.	Jew	M.	24	Fever	....	....	<i>E. histolytica</i> cysts	Emetine 9 grs. in 12 days. Potass. citrate orally.	2 examinations. Negative.	
30.	F. L.	E.	M.	33	Diarrhœa	Occasional attacks for some time.	....	<i>E. histolytica</i> cysts	Emetine 9 grs. in 12 days. Sodi citrate orally.	<i>E. histolytica</i> cysts	
31.	Maj. S.	E.	M.	43	Abdominal colic	Liver abscess 9 years previously.	Treated by emetine injections and aspiration.	<i>E. histolytica</i> cysts	Emetine 9 grs. in 9 days. Sodi citrate orally.	1 examination. Negative.	
32.	G. K.	M.	M.	26	Dysentery *	3 months' duration.	....	Veg. <i>E. histolytica</i> .	Emetine 9 grs. in 9 days.	3 examinations. Negative.	

carriers admitted for conditions other than amœbiasis.

The results may be summed up as follows:—

Cases treated, 32.

Possible cures, 6 (Nos. 3, 4, 6, 15, 22 and 28).

Failures of treatment, 10 (Nos. 13, 16, 17, 18, 20, 21, 24, 25, 26 and 30).

Indeterminate, 16 (Nos. 1, 2, 5, 7, 8, 9, 10, 11, 12, 14, 19, 23, 27, 29, 31 and 32).

(Case 23 was re-admitted with amœbic infection 3½ years after discharge, but this may have been either a relapse or a fresh infection).

The ratio of possible cures to failures on this table is as 6:10 or as 1:1.7, which is somewhat worse than the results with Alcresta Ipecac. After treatment the ratio of positive to negative stools was as 12:84 or 1:7, a figure which corresponds exactly to the one for Alcresta Ipecac. The average number of grains of emetine administered per course was 7.4, and the cost at Rs. 2 per tube of 6 one-grain-tablets of emetine works out at an average of Rs. 2-7-6 per treatment.

These results are very similar to those of other workers. There is no doubt that emetine injections will occasionally eradicate an infection with *E. histolytica*—and apparently the alkaloid is more active when an actual condition of dysentery is present than in cases of chronic amœbic colitis, but in the majority of cases the injections do not achieve more than cleaning up the symptoms. Case 3 in Table II, a case of active dysentery, appears to have been completely cured. Case 4, one of chronic and relapsing dysentery, was almost certainly cured. Case 28, with a similar history, was also almost certainly cured.

The results, on the whole, however, are very disappointing.

III. EMETINE INJECTIONS PLUS THE ADMINISTRATION OF LARGE DOSES OF BISMUTH ORALLY. (Deeks' treatment.)

Historical.—The treatment of dysentery by administration of very large doses of bismuth orally was resorted to about 1908 by Dr. W. E. Deeks at the Ancon Hospital, Panama Canal Zone, and gave promising results. These were analysed in a first paper by Deeks (1913), and in a later paper by the same author (1914). In the meantime the use of emetine in the treatment of amœbic dysentery had been introduced by Sir Leonard Rogers in 1912, and Deeks now turned to a line of treatment by daily injections of emetine, combined with oral administration of massive doses of bismuth salts. W. M. James (1913) studied the effects upon the vegetative forms of *E. histolytica* of bismuth and of emetine respectively, and showed that the amœbæ passed by patients on bismuth or on emetine treatment were degenerating, but that the type of degeneration was different with the two drugs. He suggests that to some extent the bismuth subnitrate may be converted into bismuth sulphide in the gut, and that this may deprive the amœbæ of hydrogen sulphide, which may be an essential element of their food supply. He advocates a course of from 9 to 12 grains of emetine by injection, and

bismuth subnitrate, 3 drs. suspended in water orally every 3 or 4 hours; and compares the combined emetine and bismuth therapy to the combined salvarsan-mercury treatment in syphilis.

Deeks (1914), in publishing his first results with emetine, notes that the simultaneous administration of bismuth subnitrate in teaspoonful doses 3 times a day will control any diarrhoea which may be present, and writes, "I believe that with the two drugs, either singly or combined, almost every case of amœbic dysentery can be cured..... It is better to combine bismuth with the emetine."

W. M. James (1916) is emphatic in his claim for the value of the combined treatment "Intestinal amœbiasis, whether acute or chronic, can be eradicated," he writes, "provided the patient is not in *extremis* with the acute form, with the same certainty as malaria and with more certainty than syphilis, by the use of a liquid diet until the stools are formed, and of bismuth given in doses of not less than a teaspoonful 4 times a day, continuing over a period of several weeks, and emetine carried to the point of physiological reaction."

Warrington Yorke (1919) speaks very highly of the value of this treatment in active amœbic dysentery. "A preliminary saline purge is given unless the acute dysentery has already persisted for several days, in which case it is unnecessary. Emetine hydrochloride, gr. i, is injected subcutaneously, and bismuth subnitrate drs. ii or drs. iii, suspended in milk or water is given by the mouth 3 or 4 times a day for a period of 12 days. Occasionally, a morning saline may be necessary if the bismuth causes constipation. This treatment, in my experience, invariably clears the stools of entamœbæ—a result which can by no means be claimed for emetine alone."

Connor (1918) records over 100 cases treated by this method between 1914 and 1918 at Ancon, and states that, as far as could be ascertained, only one relapsed. James and Deeks (1924) state that 75 persons who had been cured by this treatment between 1914 and 1923 were living in the Canal Zone, and none of them had relapsed. They believe that certain products of putrefaction are essential to the life of the amœbæ, and that bismuth acts either by destroying the putrefactive bacteria, or by neutralising some product essential to the life of the amœbæ. Occasional untoward effects are noted, due to the use of impure bismuth. Judging from clinical experience, cases of amœbic dysentery are cured in this manner with but few relapses.

Deuskar (1926) has tried the method with very good results in the Andamans. Newman and Davies (1926) contrast the results by this treatment with the results obtained with stovarsol. The stools were examined at the 4th, 11th, 18th, 19th, 20th and 21st days after completing treatment; of 9 cases treated, 1 died from pneumonia and 1 relapsed; the 7 others appear to have been definitely cured.

RESULTS IN CALCUTTA.

Fifty-five patients received this line of treatment. Of these 11 had blood in the stools on admission, 34 were cases of chronic amœbic colitis, 1 was a case of mild amœbic hepatitis with a previous history of dysentery and cysts of *E. histolytica* in the stools, and 9 were carriers admitted for diseases other than colitis. Details are given in Table III. This treatment is the one usually given by the senior author of this paper and by Colonel Acton for all cases of amœbic infection where a dysenteric state is actually present.

The results may be summed up as follows:—

Cases treated, 55.

Probable cures, 9 (Nos. 1, 18, 19, 35, 37, 39, 48, 51 and 52).

Failures of treatment, 16 (Nos. 17, 23, 27, 32, 33, 34, 36, 38, 40, 45, 46, 47, 49, 50, 53 and 55).

Indeterminate, 30 (Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 20, 21, 22, 24, 25, 26, 28, 29, 30, 31, 41, 42, 43, 44 and 54).

Unfortunately, it proved to be impossible to follow up no less than 30 of the series treated; a fact the more to be deplored since our clinical impression of this line of treatment for cases actually suffering from dysentery at the time of admission is that it is far and away better than treatment with emetine alone.

The ratio of probable cures to failures on this table is as 9 : 16 or 1 : 1.8, a figure which is just slightly worse than that for emetine alone (though our clinical impression of this line of treatment does not in any way tally with this). On the other hand, the proportion of negative stools after treatment is higher than with the emetine or alcresta treatments; it works out at 16 positive to 139 negative stools or a ratio of 1 : 8.7. Our standard course of this treatment is the administration of 9 grains of emetine in 12 days, together with 2 drs. of bismuth subnitrates t.i.d. on 9 out of 12 days. The cost of bismuth subnitrates (Howards') being Rs. 3-12-0 per lb., the approximate cost of this treatment works out at Rs. 4-9-4.

The very large proportion of indeterminate cases renders the results reported in Table III too vague to be of much value, but in some instances this line of treatment appears to establish a definite and certain cure; instances in the table are Cases 1, 18, 19, 27, 35, 37, 39, 48, 51 and 52. Case 39 was particularly interesting. This patient, a European male, aged 35, had been suffering from chronic relapsing amœbic dysentery for three years; he had received all sorts of irregular treatment from various practitioners in Calcutta as an out-patient, and finally came into the hospital as a last resort. After treatment he systematically sent one stool a week to the laboratory for examination for eight weeks; all examinations were negative, and two years after treatment he was in excellent health, with no return of symptoms.

In our experience the addition of the "Panama bismuth" treatment, from the clinical point of view at least, certainly improves results; but even the combined treatment appears more often than not to fail to eradicate the infection.

IV. EMETINE BISMUTH IODIDE. "E. B. I."

Historical.—The history of the introduction of emetine bismuth iodide is interesting. Tull Walsh (1891), being dissatisfied with the results of oral administration of emetine, tried the double iodide of emetine and mercury in Calcutta on 22 cases. The average number of days during which dysenteric stools were passed was 49 and he reported that "although emetine mercuric iodide seems a useful drug, it is not proved to be much better

than preparations of *Wrightea antidysenterica*..... nor do I recommend it above other drugs." No further attention to the use of double iodides was paid until DuMez (1915) manufactured emetine mercuric iodide and emetine bismuthous iodide, and suggested as the result of experiments on dogs that these two compounds might be capable of administration in large and frequent doses, which would permit of the emetine coming into contact for a prolonged period with the entamœbæ.

The treatment of carriers during the Great War with emetine or with ippecacuanha having proved extremely unsatisfactory, Dr. Dale under the auspices of the National Medical Research Council took up the study of emetine bismuth iodide in 1916. It was found that large cats weighing 3 kilograms could stand doses up to 40 mgms. without vomiting, and the drug was first tested on 10 human carriers. Of these, 6 were followed up with stringent daily examination of the stools for 6 weeks, and appeared to be permanently cured. A seventh relapsed, but was free from infection after a second course of treatment. The eighth case was unable to stand the full course, but cysts were still absent. The ninth patient relapsed, whilst the tenth could not continue with the treatment owing to the vomiting and diarrhœa it caused.

From this date onwards the literature on "E. B. I." became abundant, and the drug appears to have been used chiefly by the British school of workers. Low and Dobell (1916) reported on 3 cases: 1 of acute dysentery, the other 2 carriers, with good results. Dobell (1916) reported on the treatment of 11 carriers who had not been cured by injections of emetine. Twenty-one carriers were first treated with a full course of emetine injections; and subsequent stool examinations showed that 14 were not cured. Of these 14, 11 were put on to "E. B. I." treatment, and the other 3—as controls—on to a second course of emetine injections. All 11 of the former series were discharged as cured, examination of from 6 to 10 stools after treatment in the case of 10 of them having failed to show any forms of *E. histolytica*. None of the 3 controls, re-treated with emetine, were cured. Two further uncured controls were now treated with "E. B. I." and gave respectively 16 and 15 negative findings in the stools after treatment. Four further newly detected carriers were also treated, and subsequently gave from 4 to 9 negative findings. "The effect of the administration of the double iodide upon the protozoal content of the stools—which are the effects that have especially come under my own observation," writes Dobell, "is truly remarkable. Within 4 days of the commencement of treatment all stages of *Entamœba histolytica*, whether amœbæ or cysts, have completely vanished from the faeces, and in no single instance have they been subsequently found. When it is remembered that some of the cases had been found to be passing cysts in large numbers almost every time they had been examined previously—for weeks, and in some cases for months—it will cause no surprise when I say that the results of the double iodide treatment have appeared to be astounding."

Dobell's second paper on the subject was now followed up in 1917 by the most important memoir that has appeared in the literature. *Medical Research Committee Special Report Series*, No. 4 (Dobell, 1917). After treatment with "E. B. I." in fairly large doses, the following results were obtained:—

Number of patients treated ..	26.
Number of cures ..	14, or 53.8 per cent.
Number of doubtful cures ..	9, or 34.6 per cent.
Number of certain failures ..	1, or 3.8 per cent.
Number of doubtful failures ..	2, or 7.7 per cent.

"It seems reasonable to conclude," he writes, "that there is no direct evidence that treatment with the double iodide has ever been unsuccessful when given in sufficient quantities. For most cases, 36 to 40 grains will suffice; for others, however, more—up to 60 or

No.	Name.	Caste.	Sex.	Age.	Disease for which admitted.	Pre-
29.	Mr. B.	E.	M.	21	Fever	
30.	H. W.	E.	M.	11	Colitis	
31.	C. G. T.	E.	F.	7	Fever	
32.	J. S.	H.	M.	27	Colitis	
33.	F. M.	A. I.	M.	..	Colitis	
34.	Mrs. A.	E.	F.	40	Colitis	W: D
35.	Mr. H.	E.	M.	25	Dysentery	Du: or
36.	Mrs. C.	E.	F.	24	Colitis	Dy: be to
37.	Mr. T.	E.	M.	30	Dysentery	Dy m
38.	S. D.	H.	F.	33	Fever	
39.	Mr. T.	E.	M.	35	Chronic dysen- tery.	Dys be la
40.	Mrs. W.	E.	F.	51	Colitis	Off 1
41.	C. N.	A. I.	M.	18	Dysentery	1 ti
42.	B. B.	A. I.	F.	15	Leucoderma	
43.	T. B. D.	E.	M.	25	Dysentery	Dy

Then put on
stovarsol.Then put on
alcresta ipcac.Then put on
yaten.Then put on
stovarsol.Then put on
yaten.Then put on
yaten.Then put on
yaten.Then put on
yaten. 6 later
examinations
all negative.

Previous intestinal history.	Previous treatment.	Findings in stool on admission.	Treatment.	Findings in stool after treatment.	REMARKS.
3 5 9 2 f t s t c i v t i a l Dysentery t l t h diarrhoea. uration 1 year. r t ation off and for 3 years. sentry 5 years fore. <i>E. histolytica</i> +. sentry 6 onths before. sentry 3 years fore. 3 re- sponses since. and on for year or more. h's dura- ... sentry also 1	.... .... .... .... 6 emetine injections. 3 emetine injections. Many emetine injections. Emetine injections. Vaccine treatment. Emetine injections. "E. B. I." full course. Relapsed. Again treated. Relapsed. Again treated. Emetine injections. Emetine injections. Emetine injections. A 1 s o course of "E. B. I." Emetine injections. Relapsed.	<i>E. histolytica</i> cysts <i>E. histolytica</i> cysts <i>E. histolytica</i> cysts <i>E. histolytica</i> cysts <i>E. histolytica</i> cysts <i>E. histolytica</i> cysts Veg. <i>E. histolytica</i> . <i>E. histolytica</i> cysts Veg. <i>E. histolytica</i> . Veg. <i>E. histolytica</i> . <i>E. histolytica</i> : veg. and cysts. <i>E. histolytica</i> cysts Veg. <i>E. histolytica</i> .	Emetine 9 grs. in 9 days. Bis-muth carb. $\bar{5}$ i, t.d.s. Emetine 6 grs. in 12 days. Bis-muth carb. $\bar{5}$ i, t.d.s. Emetine 3 grs. in 12 days. Bis-muth carb. $\bar{5}$ ss, t.d.s. Emetine 9 grs. in 12 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 6 grs. in 6 days. Bis-muth carb. $\bar{5}$ i, t.d.s. Emetine 7 grs. intravenously in 8 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 9 grs. intravenously in 9 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 9 grs. in 9 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 9 grs. in 9 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 9 grs. intravenously in 9 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 7 grs. in 7 days. Bis-muth carb. $\bar{5}$ i, t.d.s. Emetine 6½ grs. in 9 days. Bis-muth carb. $\bar{5}$ ii, t.d.s. Emetine 6 grs. in 6 days. Bis-muth subnitrates $\bar{5}$ i, t.d.s. Emetine 6 grs. in 6 days. Bis-muth carb. $\bar{5}$ i, t.d.s. Emetine 6 grs. in 6 days. Bis-	3 examinations. Negative. 1 examination. Negative. 1 examination. Negative. 1 examination. <i>E. histolytica</i> cysts. 1 examination. <i>E. histolytica</i> cysts. 2 examinations. <i>E. histolytica</i> cysts at 2nd. 6 examinations. Negative. 1 examination. <i>E. histolytica</i> cysts. 6 examinations. Negative. 1 examination. Veg. <i>E. histolytica</i> . 1 examination. Negative. C. L. crystals+. 8 later examinations (1 a week) with negative results. 2 examinations. <i>E. histolytica</i> cysts. C. L. crystals at 2nd. 3 examinations. Negative. 2 examinations. Negative. 2 examinations.	Then put on yatren. Then put on stovarsol. Then put on emetine. Then put on kurchi. Then put on stovarsol. Then put on stovarsol.

even 70 grains—may be necessary." His conclusions are as follows:—

(i) Emetine bismuth iodide, properly administered, has successfully cured the majority of carriers of *E. histolytica* that have hitherto been treated.

(ii) In acute dysentery the results obtained have been very satisfactory, but further trials are necessary.

(iii) For treatment to be successful, the drug must be given in large quantities—not less than 36 to 40 grains, in daily doses of 3 or 4 grains. Less than this amount is seldom efficacious, and more may be necessary in individual cases.

(iv) Emetine administered in this form has generally been successful, even when previous treatment with emetine hydrochloride injections had proved a failure."

As the result of the publication of this report, the "E. B. I." treatment became the standard one for carriers. Imrie and Roche (1917) reported 6 cases, 4 of whom had previously been unsuccessfully treated with emetine injections, cured by "E. B. I." with negative findings in the stools up to a month after the cessation of treatment. Low (1917) records that 2 cases previously treated by Dobell and himself had been followed up for 6 and 7 months respectively, and their stools had remained consistently negative. Three further cases in whom amoebic hepatitis was present as a complication rapidly yielded to the treatment, also one of "general amoebiasis"—i.e., a febrile state without definite symptoms, but with cysts of *E. histolytica* in the stools. Two convalescent carriers and a relapsing case of amoebic dysentery were cured. In all these cases repeated examination of the stools after the cessation of treatment gave negative results. In connection with the method of administration a small meal of arrowroot is given at 10 p.m., followed by 3 grains of "E. B. I." in a gelatine capsule. The pillows are removed and the head kept low; whilst the patient is instructed to sip hot water if any sign of nausea is felt. A course of not less than 12 consecutive doses, each of gr. iii, is essential. Leboeuf (1917) advocates keratin-coated pills, but these were found to be most unsatisfactory by the British workers. Savage and Young (1917) record 22 cases cured out of 33 to whom one course of "E. B. I." was given; 3 relapses out of 3 resistant cases to whom a second course was given; and only 3 cures out of 10 cases treated by emetine injections plus "E. B. I." orally.

Waddell, Banks, Watson and King (1917) report on 102 carriers treated. The dose was given at 1 p.m. after the midday meal, and vomiting and purging were marked in most of the cases. (Almost all authorities are agreed that the treatment should be given the last thing at night.) They found "E. B. I." much more effective than emetine in the treatment of carriers, but from 20 to 25 per cent. of failures occurred. Using keratin-coated tablets, 19 out of the 102 cases treated were failures. The patients should be kept under observation for 14 days after the end of treatment, and the stools examined at least 4 times. Lillie and Shephard (1917) treated 104 carriers. They contrast the use of salol-coated and keratin-coated pills, and state that the former gave the more consistently successful results. Previous injections of emetine may render the carrier more resistant to "E. B. I." treatment. In cases which had received no previous treatment two courses of salol-coated pills led to a cure rate of 78 per cent., the test for cure being not less than 5 negative stool examinations in 5 weeks after the cessation of treatment. The last series treated was at the Barton Convalescent Depot; and 142 carriers were cured out of 160 = 88.7 per cent. Lambert (1918) treated 40 Indian cases suffering from amoebic dysentery in Mesopotamia either with "E. B. I." only, or with "E. B. I." and emetine injections. He reports that for acute cases the combined treatment gives the best results. In relapsing cases and carriers "E. B. I." alone is better than the combined treatment. "We have in emetine bismuth iodide a combination of considerable potency in the treatment of amoebic dysentery, particularly when the amoebae are assuming their resistant stage." He remarks

that for the debilitated Indian troops with whom he was dealing the nightly dose should be gr. ii.

Low (1918) records an acute first attack of amoebic dysentery in a patient who was cured by "E. B. I." with 21 subsequent observations of the stools; 2 cases of acute exacerbation cured, with 53 subsequent negative examinations; and 2 subacute cases, of whom 1 was cured (35 subsequent negative examinations) and 1 relapsed. Watson-Wemyss and Bentham (1918) treated 30 carriers from the Mediterranean war fronts. The test for cure was a minimum of 4 weeks subsequent observation, with 6 stool examinations. Only 3 of the cases were failures of treatment, of whom 1 was cured after a second course, and the other 2 proved completely refractory. Broc and Chalton (1918) record 6 cases of amoebic dysentery cured by "E. B. I." A second paper by Lambert (1918a) appears to deal with the series of 40 Indian patients upon whom he had previously reported in another journal.

A useful summary, based upon a study of 463 cases observed at the Reading War Hospital, is that by Donaldson, Clark and McLean (1918). In order to detect all cases of infection at least 5 examinations of the stools should be made. Considering the amount of previous treatment with emetine which these patients had received before being invalided, they consider that emetine is comparatively useless in eradicating the infection. "E. B. I." and an emetine absorption product tested both yielded approximately equal results,—cure rate 50 to 60 per cent.,—but the latter induced less vomiting and gastric disturbance. They advocate the following up of carriers discharged from the army to civil life. Mackinnon (1918) records the results of "E. B. I." treatment in 131 carriers. Of these, 62 remained clear of infection for 4 weeks, and 69 relapsed. Of 16 men who received a second treatment, 6 remained clear and 10 relapsed. Two men who had a third course were clear for 4 weeks after treatment. (One of these also received emetine injections.)

Turner and Taylor (1919) used "E. B. I." in the treatment of 284 carriers; after 1 course of treatment 57.4 per cent. cleared up; after 2 courses 71.8 per cent.; after 3 courses 75.7 per cent. Of 932 men transferred to the Barton Depot after negative findings in their stools at different hospitals, both convalescents and non-dysenterics, 49 were subsequently found to be positive. The strains of *E. histolytica* with small cysts appear to be more amenable to treatment than the strains with larger cysts. Gunn and Savage (1919) report the following series:—

(i) "E. B. I." orally for 12 days; 4 acute cases cured out of 10; and 9 out of 14 carriers.

(ii) "E. B. I." orally plus emetine injections for 12 days; 5 out of 6 cases cured; and cure in all 6 carriers so treated.

(iii) Emetine hypodermically for 12 days, followed by "E. B. I." gr. ii daily for 14 days; 15 out of 24 acute cases cured; and 58 out of 68 carriers. They report this to be the best line of treatment tested.

(iv) Similar treatment to (iii), but the daily dose of "E. B. I." was gr. iii; 67 out of 96 acute cases cured; and 103 out of 122 carriers.

Brug (1919) is by no means as satisfied with the value of "E. B. I." as are most of the British workers. He records only 1 out of 7 cases as cured; the test for cure being 7 negative stool examinations within one month from the end of treatment. He advocates the supplementary use of salvarsan.

In common with other workers, Jepps (1921) finds salol-coated pills of "E. B. I." unreliable. After a 12-day course consisting of 36 grains, 45 per cent. relapsed out of a series of 26 cases tested. A suspension of "E. B. I." in powder form in liquid paraffin gave better results; 12.7 per cent. of relapses in a series of 63 cases treated. After two treatments, 11.1 per cent. of the cases were still not cured. In the whole series of patients treated with "E. B. I." 75 in all, in 10 instances the treatment had to be temporarily or permanently stopped on account of untoward symptoms. The "E. B. I." was given the last thing at night half an

hour after a dose of 10 minims of chlorodyne, and the patient allowed to sip hot tea afterwards, if desired.

Rennie (1922) deals with 87 cases treated at the London Hospital for Tropical Diseases, 59 of them diagnosed microscopically, and the remaining 26 on clinical grounds. It was not possible to follow up many of the patients subsequently, though 3 are known to have relapsed. He notes that the patients must be kept in bed whilst under treatment; delayed vomiting appears to indicate that the drug is beginning to take effect; diet must be light and restricted; and the gain in weight on cure is often remarkable.

The findings of Willmore (1923) have already been quoted. His standard course consisted of 10 grs. of emetine by injection, and 60 grs. of "E. B. I." given orally concurrently in 20 days. All cases were microscopically diagnosed, and 358 treated in all. The relapse rates were: after one treatment, 72 per cent.; after 2 courses (given to resistant cases), 80 per cent.; after 3 courses, 95 per cent., whilst 3 very resistant cases which received respectively four, five, and six courses all relapsed. He advocates the additional administration of emetine base in oily suspension by enema. Oliver (1924) records treating 8 cases of amoebic dysentery in Mesopotamia with "E. B. I."; of these 6 relapsed. French and Sellards (1924) comment on the difficulties in carrying out a thorough course of "E. B. I." treatment, even with salol-coated pills. The response was poor and the results unsatisfactory. Many patients refused the drug in capsule form on account of the attendant nausea and vomiting.

Manson-Bahr and Sayers (1927) state that many cases which failed to respond to emetine responded to "E. B. I." given orally. Forty cases were treated, but 5 which received full courses failed to respond. In those that were cured, the gain in weight was remarkable. Three cases relapsed after no less than 9 courses of treatment. "There is no doubt," they write, "that its introduction has considerably raised the percentage of cases of chronic amoebic dysentery permanently cured, but there still remains a fairly large residue who, in spite of all known treatments, live with the certainty that sooner or later they will relapse to their former condition..... Not even the most enthusiastic advocate of emetine or emetine bismuth iodide would claim that such treatment is ideal from the point of view of the patient..... a less toxic and more efficient drug had clearly become very desirable in the treatment of amoebiasis."

RESULTS IN CALCUTTA.

Twenty-three patients received the "E. B. I." treatment. Two of them were passing blood in the stools on admission; 12 were sufferers from chronic amoebiasis; and 9 were carriers admitted for diseases other than amoebiasis. Details are shown in Table IV.

We have been particularly unfortunate in this series in not being able to follow up patients. The results, which are as follows, show a very large proportion of cases not followed up.

Cases treated, 23.

Probable cures, 2 (Nos. 2 and 17).

Failures of treatment, 7 (Nos. 14, 15, 18, 19, 20, 22 and 23).

Indeterminate, 14 (Nos. 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16 and 21).

The ratio of probable cures to failures, 2:7 or 1:3.5 is a very low one. After treatment 10 stools were positive and 65 negative: a ratio of 1:6.5. Assuming a standard course to consist of 20 grains given in 10 days, the approximate cost per course of treatment works out at Rs. 3-5-4.

The degree of tolerance of patients to emetine bismuth iodide varies very widely. The weight of the ordinary Indian patient is much lower than that of the adult European, and very few will comfortably tolerate a dose of more than gr. ii. We have always given the drug in powder form, gr. ii suspended in half an ounce of liquid paraffin the last thing at night. It may be necessary to give either Omnopon (Roche) gr. 1/6th, or 10 minims of chlorodyne half an hour previously. The patients recorded in Table IV for the most part tolerated this line of treatment very well, but in three other cases (not included in the table) the "E. B. I." treatment had to be stopped on account of vomiting or diarrhoea.

Certain individual patients seem to do much better on "E. B. I." than others. Case 2 in Table IV was a patient who had irregular and recurrent attacks of amoebic dysentery for ten years. He tolerated a dose of gr. iii each night for ten days without any trouble, and appeared to have been completely cured, as eight examinations of the stools after treatment gave negative results, whilst he put on 18 lbs. in weight. Whilst our general opinion of the value of "E. B. I." is not as high as that of Dobell (1916, 1917), yet we are bound to admit that the treatment is eminently successful in certain individuals and often surprisingly well tolerated. On the other hand, results usually appear to be uncertain, whilst the nauseating qualities of the drug are prominent.

V. YATREN.

Historical.—The makers of "Yatren 105" (Behring and Co.) claim that it is 7-iodine-8-oxyquinolin-5-sulphonic acid, containing 36.2 per cent. of iodine, with sodium bicarbonate added to increase its solubility. It is an odourless, finely crystalline powder, of light yellow colour, with a solubility of about 4 per cent. Their further claim, that "yatren is as specific a cure for amoebic dysentery as quinine is for malaria," in our opinion at least, is too optimistic.

The first workers to use yatren were apparently Mühlens and Menk (1921). They treated 8 resistant cases (two of whom had even undergone cecostomy) and remarkable clinical improvement took place. By the mouth keratin-coated pills of 1 gramme each t.i.d. are well borne, they claim, whilst if ulceration is found to be present by sigmoidoscopy, the oral treatment should be supplemented by rectal injections of a 2½ per cent. solution of yatren. The scheme of treatment outlined consists of a first course of 8 to 14 days of the combined rectal and oral treatment, with sigmoidoscopic and microscopic controls; then a week's interval; then a repetition of the treatment for from 3 to 7 days; then a second interval; and finally a third course of 3 to 5 days. Rest and strict dieting are essential.

Mello (1922) reports successful treatment with yatren in 6 cases which had proved refractory to emetine. The combined oral and rectal treatment was given, and the rapidity and completeness of cure is said to have been "truly surprising."

Menk (1922) reported 3 cases successfully treated, but states that thorough treatment lasting 5 to 6 weeks is essential, and that it should be continued even after the stools have become normal. One such treatment every 6 months (two courses in all) is advised. Birt

(1923) reports on the use of yatren in chronic cases at Shanghai, and records the treatment of 28 cases, 14 of them recent ones, the other 14 cases of old standing. He considers that 16 of them must be considered as completely cured. He states that he used a 10 per cent. solution per rectum, and comments on the pain and tenesmus which some of these injections caused. Menk (1923) points out that the solubility of yatren is only about 5 per cent. and that Birt's 10 per cent. solution must have contained undissolved yatren, which would account for the pain and tenesmus complained of. Initially an enema of 200 c.c. of a 5 per cent. solution should be used; later the patient can often tolerate up to 400 c.c. Kuenen (1922) reports on the treatment of 4 cases with yatren, 1 gm. t.i.d. orally for 8 to 14 days, and speaks of the results as very favourable. Huppenbauer (1923) reports 2 cases of chronic intractable dysentery cured by yatren lavage, with subsequent after-treatment by yatren orally.

From this point onwards, the literature becomes very extensive, and we may confine our attention only to the more important papers. R. M. Gordon (1923) reported on a chronic case of 5 years' duration treated by enemata, 200 c.c. of a 5 per cent. solution for 10 days, then 6 days rest, then a final injection; this patient relapsed 28 days later. A second patient to whom the full course advocated by Mühlens and Menk was given relapsed 14 days after the completion of treatment. Menk (1922a) records the treatment of 17 cases of chronic amœbic colitis; 3 were uninfluenced; in the others amœbæ rapidly disappeared, but in 2 instances returned "after a time." He advocates following up the yatren treatment with emetine injections. de Langen (1923) records very satisfactory results in 36 cases treated, from both the clinical and parasitological points of view. Apart from the diarrhoea which it causes, the drug is well tolerated. Lichtenstein (1923) reports on 4 cases: 1 treated with subsequently negative stools; 1 clinically cured; 1 a complete failure; and the fourth, in whom the treatment had to be suspended on account of the untoward symptoms caused by the drug. Kop (1923) speaks very favourably of the drug, and quotes a refractory case in a boy aged 10 where after 2 days' treatment all protozoa vanished from the stools and had not returned on several examinations; the cost of the double course of treatment, however, was £5. Traviaglino and Soedjono (1924) place yatren first on a trial of different methods in 350 cases, but seem to rely on clinical cure, since they apparently do not consider the presence of cysts as proof of continuing infection. Bax (1924, 1925) uses a concentration method in examining the stools for cysts after yatren treatment; 25 cases were treated and controlled by stool examination, with the following results: 6 permanently cured and under observation for 1 year; in another 10, amœbæ were apparently completely eliminated; 5 cases apparently cured and under observation for 6 months; 2 improved; 2 no improvement. Jacobi (1924) recommends oral treatment with yatren in cachets; each cachet contains 0.5 gm.; 4 cachets are given on the first day, 6 on the 3 succeeding days; afterwards 4 a day. A course should consist of about 40 cachets. An illustrative instance is quoted of the success with this drug in a case where other treatments had failed. Beijnen (1924) records a series of 22 carriers and 9 patients passing vegetative amœbæ treated orally with doses of $\frac{1}{2}$ to $\frac{3}{4}$ gramme t.i.d. for 10 days. The stools were subsequently examined every fortnight for periods varying from 2 to 18 months. In 17 cases so controlled, in only 1 did cysts re-appear. The author concludes that yatren is a most efficient remedy in amœbiasis, and should be given orally.

Kessel and Willner (1925) treated 19 cases; 0.5 gm. in gelatine capsules was given 6 times daily on the 1st, 3rd, 5th and 7th days; and 3 gms. dissolved in 200 c.c. of distilled water as an enema on the 2nd, 4th, 6th, 10th, 14th and 21st days. Rest in bed for 7 days and for half days on the 10th, 14th and 21st days; the dietary arranged according to the degree of purgation present. With this course of treatment 17 out of

19 cases remained negative for a period of 6 months after the completion of treatment, and 6 examinations of the stools yielded negative results.

Manson-Bahr and Morris (1925) record 4 cases controlled by periodic microscopical examination of the stools and apparently permanently cured by the combined oral and rectal treatment. Mühlens (1925) gives an account of his first 5 years' experience with the drug. He gives the following comparative figures:—

	Emetine.	Yatren.
Cost per treatment	Mex. \$5.60	Mex. \$6.40.
Time in hospital ..	12 days	7 days
Working days lost ..	26 days	9½ days

Huppenbauer (1925), in an address to the German Society of Tropical Medicine, claims that the supreme test of the value of yatren is its efficacy in the treatment of chronic amœbiasis and its complications—just where emetine and "E. B. I." failed. It is claimed as a redoubtable victory for German chemistry and pharmacology. Rodenwaldt (1925) says that doses of 1 gm. powder or pill t.i.d. are well borne by the patient; and that in severe cases or relapses 9 gms. can be given by the month a day. Katsurada (1925) states that his experience with yatren has been very satisfactory; he gives 1.8 gm. per day for 7 days, after which the stools become negative. Hirayama (1925) records 13 cases treated with very satisfactory results. Boyers (1925) writes, "Yatren has been much used by us in the past 2 years. We have yet to obtain by yatren complete eradication of both motile and encysted *E. dysenteriae* in any case. However, we have found it a valuable adjunct to treatment. It is especially useful in feeble patients and in the treatment of the ever-present colitis." Lamberts (1926) states that in his experience yatren is the drug of choice for all cases of intestinal amœbiasis, and speaks of the prophylactic use of yatren pills. Buehlmann (1926) considers that emetine is dangerous in children, and advocates yatren as safe in the treatment of amœbiasis in children; he considers that yatren will ultimately supersede emetine in the treatment of chronic amœbic dysentery in adults. Ruge (1926) gives an 8 to 10 day course of 3 gms. daily in divided doses; then an interval of 3 to 4 weeks; and then a second course. When administered per rectum the enema should not be too large. Bach and Steinhauer (1926) record the results of yatren treatment in a patient who had been suffering from chronic amœbic dysentery for 27 years. Rapid and complete restoration to health resulted, and the stools were negative up to 5 months later. Drake-Brockman (1926) advocates 9 pills a day for a fortnight; then 6 pills a day for 1 week; then 3 pills a day for a fourth week. If the sigmoidoscope shows ulceration in the rectum yatren enemata should also be given; he is of opinion, however, that when the lesions are high up in the colon or cæcum no drug can replace ipecacuanha and its derivatives. Rehbein (1926) has treated over 200 cases of acute or chronic amœbic dysentery with yatren, and emphatically states that for the treatment of all forms of amœbic dysentery yatren far surpasses other known remedies. Mühlens (1926) emphasises that chronic cases clear with great rapidity on oral treatment alone; whilst in acute cases its action is almost abortive on the condition. For very chronic cases rectal administration must be combined with oral treatment. Dalmeyer (1926), working in Java, states that in 4 years' experience of the drug, yatren has been unfailingly successful, both in acute and chronic and in "larval" amœbic dysentery. It was not always necessary to admit the patients to hospital. It is especially well tolerated by children, and can even cure liver abscess. Turner and Jones (1926) record 2 acute cases clinically cured, but not yet followed up after treatment; in 5 other cases, followed up for 1 month or more after yatren treatment, the stools have remained negative, and the patients in good health. Choy (1925) records the results in 29 cases, in 15 of which follow-up examinations were made. He considers the drug superior to emetine in "latent" and chronic cases; but that emetine is better for acute cases,

as yatren is apt to produce profuse diarrhoea and colicky pains.

Vogel (1927) has studied the action of yatren on cultures of *Entamoeba histolytica* in vitro. A solution of 1 : 100 killed the amœbæ in a few hours; solutions of 1 : 1,000 to 1 : 5,000 inhibited multiplication and the cultures gradually died out. The amœbæ proved resistant to a solution of 1 : 10,000 through 10 subcultures, but could revive in culture after 15 hours' exposure to a solution of 1 : 1,000. Funke (1926) gives a somewhat guarded opinion: "in all probability it will in a large measure replace ipecac., and.....is considerably superior to stovarsol." Juhl (1927) emphasises his opinion that for the worst type of case in children, yatren is the sole drug which will prevent a fatal termination. In purely amœbic infections one can count on its bringing about complete cure. He notes that round-worms are frequently expelled during the course of yatren treatment.

An important recent paper is one by Manson-Bahr and Sayers (1927). The usual dose by the mouth, 15 grains thrice daily, causes diarrhoea; but pills or cachets containing 4 to 8 grains thrice daily proved satisfactory. After cleansing the rectum with a 2 per cent. sodium bicarbonate enema, 200 c.c. of a 2.5 per cent. solution of yatren are run in slowly, and the patient instructed to retain it for as long as possible. As a rule patients can retain the injection for 8 hours or longer, and proof of absorption can be obtained by testing the urine with iron perchloride; yatren gives a greenish colour. The standard course is 4 to 8 grains t.i.d. for 10 days, with one daily injection per rectum. After a 5 or 7-day interval the course is then repeated. No toxic symptoms have been observed; and the authors can fully confirm the efficacy of yatren in curing long standing cases of amœbic dysentery which have proved resistant to emetine and "E. B. I." Yatren appears to be especially curative when the lesions are in the lower portion of the colon; but not where the lesions are chiefly in the cæcum and upper part of the colon, and resistant cases should be treated by a combination of "E. B. I." by the mouth and yatren per rectum. The course advocated for this condition is 3 grains of "E. B. I." every night, and a rectal injection of 200 c.c. of a 2½ per cent. yatren solution every morning for 10 days. Twenty-two intractable cases were treated with this combined treatment, and the results, as controlled by sigmoidoscopic examination, were excellent. "The combined treatment has much to be urged in its favour," they write. "It has, we think, been abundantly demonstrated that both these drugs possess a definite curative value in amœbiasis, which may be limited in its extent when they are used singly, but is much more intensive when both are combined..... Moreover, as the treatment is continuous both by day and by night, the parasite is given no chance to recuperate. Whatever may be said about the rationale of the method, the combined drugs are remarkably well tolerated, and the results, as controlled by the sigmoidoscope and backed up by clinical observations, are very satisfactory."

Waldorp (1927) reports good results with yatren, but says that a combination of yatren orally with emetine injections is better. A table of 9 cases is given. van Steenis (1927) states that yatren has no toxic or cumulative action, but that the diarrhoea induced, though harmless, is sometimes annoying. Houssiau and Duwez (1927) advocate for resistant cases courses of either emetine *plus* stovarsol, or emetine *plus* yatren; and for enfeebled patients or those with gastric derangement yatren per rectum. Buchmann (1927) states that yatren is a "specific" for amœbic dysentery, and especially suitable for administration to children, to whom emetine injections are apt to be dangerous; he gives the drug in solution, using a 2 per cent. solution and giving 1 c.c. per day for each age-month of the child. In older children this dose can be doubled.

It will be seen that, in general, the reports on yatren therapy are very favourable. On the other hand, the position with regard to the drug is suspiciously like that with regard to emetine in the days after its

first introduction. The earlier papers are very enthusiastic; later the writers become less optimistic; finally, the drug comes to be combined with some other form of treatment.

RESULTS IN CALCUTTA.

We confess that we have not used yatren in the heroic doses recommended by the makers; the reason being that any dose of more than 15 grains a day seems to cause diarrhoea immediately. Whilst there is but little tenesmus with this diarrhoea, yet it is troublesome to the patient. On the other hand, unless diarrhoea is produced, the results appear to be poor. The drug, in fact, seems to act chiefly by causing irritation of the mucosa of the colon, such irritation sometimes leading to eradication of the infection.

Twenty-three patients were treated with yatren orally. Details are given in Table V. The results may be summarised as follows:—

Cases treated, 23.

Probable cures, 6 (Nos. 1, 2, 9, 11, 15 and 23).

Failures of treatment, 8 (Nos. 10, 12, 13, 17, 18, 19, 20 and 22).

Indeterminate, 9 (Nos. 3, 4, 5, 6, 7, 8, 14, 16 and 21).

The ratio of probable cures to failures is 6 : 8 or 1 : 1.3, a figure exactly the same as that obtained with aleresta ipecac. After treatment 8 stools were positive and 64 negative; a ratio of 1 : 8, which would appear to indicate that the drug has a fairly considerable value in eradication of the infection. The retail cost of a bottle of 40 of the 0.25 gm. pills in Calcutta is Rs. 4-14-0; and assuming that 30 pills in 10 days is about a standard course of treatment, the average cost of treatment works out at Rs. 3-10-6.

As with almost all treatments, certain individual patients appear to respond better than others. Thus Case 1 in Table V cleared up completely with yatren, whereas previous courses of emetine and "E. B. I." had failed to eradicate the infection. Case 2 was a medical man from the Punjab. He had had no end of irregular treatment with emetine, and finally came to Calcutta, stating that he was so sick of life that he would commit suicide if he could not be cured. (The markedly neurasthenic tendency in some of these chronic cases of amœbic infection is often very pronounced.) Case 11 came from Secunderabad for treatment, with an almost exactly similar history. He was an European official in a very high position; had been suffering from relapsing amœbic dysentery for four years, and feared a complete nervous breakdown. He said that unless he could get the infection eradicated, he might have to retire prematurely. This patient was most conscientious in sending one stool each week for examination after the completion of treatment, and appears to have been definitely cured. He

No.	Name.	Caste.	Sex.	Age.	Disease for which admitted.	Prev
1.	G. M. B.	H.	M.	42	Rat-bite fever	
2.	R. D. P.	H.	M.	32	Malaria	
3.	B. B.	H.	M.	36	Dysentery (re-lapse).	Firs ye
4.	G. E. J.	E.	M.	30	Dysentery (re-lapsing).	Firs ye
5.	Mrs. M.	E.	F.	56	Fever	
6.	Master C.	E.	M.	14½	Fever	
7.	W. R.	A. I.	M.	18	Filariasis	
8.	J. W. C.	A. I.	M.	39	Chronic amœ-biasis.	
9.	A. E. P.	A. I.	M.	35	Chronic dysentery	Du
10.	A. E. M.	E.	M.	42	Gastric ulcer	Pai: hy St ed
11.	H. C. J.	E.	M.	..	Neurasthenia	
12.	M. F. M.	E.	M.	..	Dysentery	
13.	Mrs. A.	E.	F.	51	Relapsing dysen- tery.	1 ti
14.	Dr. C.	E.	M.	46	Dysentery (re-lapse).	Fir. ye
15.	R. C.	H.	M.	26	Dysentery	6 ti
16.	Miss F.	A. I.	F.	14	Irregular fever	
17.	Mrs. H.	E.	F.	43	Dysentery	Fir. ye
18.	Mr. T.	E.	M.	36	Chronic relaps- ing dysentery.	3 ti la ev
19.	Mr. L.	E.	M.	38	Dysentery	Offi 1

TABLE VI.
Stovarsol.

Previous treatment.	Findings in stool on admission.	Treatment.	Findings in stool after treatment.	REMARKS.
....	Veg. <i>E. histolytica</i> .	Stovarsol 1 tab. b.d. 10 days.	2 examinations. Negative.	
....	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 8 days.	1 examination 10 days later. Negative.	
Ayurvedic	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 10 days.	1 examination. Negative.	
Emetine injections.	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 10 days.	1 examination. Negative.	
....	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 8 days.	1 examination. Negative.	
....	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 12 days.	1 examination. Negative.	
....	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 6 days.	2 examinations. Negative.	
Concussion. Alcresta ipecac. Emetine. Yatrene. "E. B. I."	<i>E. histolytica</i> cysts. <i>Giardia</i> cysts.	Stovarsol 1 tab. b.d. 10 days.	3 examinations. Veg. <i>E. histolytica</i> at the 3rd.	Then put on kurchi.
5 courses of emetine injections.	C. L. crystals	Stovarsol 1 tab. b.d. 10 days.	6 examinations. Veg. <i>E. histolytica</i> at 6th.	Then put on kurchi.
Course of alcresta ipecac.	Veg. <i>E. histolytica</i> . C. L. crystals.	Stovarsol 1 tab. b.d. 10 days.	8 examinations in 11 days. Negative.	Then transferred for operation.
....	<i>E. histolytica</i> : veg. and cysts.	Stovarsol 1 tab. b.d. 7 days.	1 examination. Negative.	
2 courses of emetine. Course of emetine with bismuth. Yatrene.	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 10 days.	2 examinations. Negative.	
Emetine injections. Course of emetine with bismuth.	<i>E. histolytica</i> , veg. and cysts.	Stovarsol 1 tab. b.d. 10 days.	7 examinations. Negative.	
....	<i>E. histolytica</i> cysts. C. L. crystals.	Stovarsol 1 tab. b.d. 10 days.	2 examinations. <i>E. histolytica</i> cysts at 2nd.	Then put on yatrene.
Emetine injections.	Veg. <i>E. histolytica</i> .	Stovarsol 1 tab. b.d. 10 days.	1 examination. Negative.	
....	<i>E. histolytica</i> : veg. and cysts. <i>Trichomonas</i> . Hemolytic streptococcus.	Stovarsol 1 tab. b.d. 12 days.	4 examinations in 8 days. Negative.	Also treated with autogenous streptococcal vaccine.
Emetine injections. Stovarsol. Course of yatrene.	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 8 days.	3 examinations. <i>E. histolytica</i> at 3rd.	Then put on emetine and kurchi.
Several courses of emetine. Emetine injections and bismuth course.	Veg. <i>E. histolytica</i> .	Stovarsol 1 tab. b.d. 10 days.	8 examinations in 8 weeks. Negative.	
3 courses of emetine injections. "E. B. I." full course. Emetine injections.	<i>E. histolytica</i> cysts	Stovarsol 1 tab. b.d. 10 days.	16 examinations in 1 month. Negative.	

wrote a year later that he was in good health. Case 15 was another very chronic and emetine-resistant case, who appeared to clear up rapidly on yatren treatment. Case 22 unfortunately refused to stay in hospital for a proper course of treatment; the stools were still full of motile *E. histolytica* on the day he left hospital.

Only six patients were treated by the combined treatment with yatren orally and yatren simultaneously by the rectum. These are not unselected cases, as this line of treatment is so very expensive that it was reserved for very intractable cases. Details are given in Table V. The results were as follows:—

Cases treated, 6.

Probable cures, 2 (Nos. 1 and 2).

Failures of treatment, 3 (Nos. 3, 4 and 6).

Indeterminate, 1 (No. 5).

The ratio of probable cures to failures is as 2:3 or 1:1.5; but it must be remembered that the treatment was reserved for very intractable cases. After treatment 4 stools were positive and 25 negative; a ratio of 1:6.2.

Again, certain individual cases responded much better than others. Thus Case 2 had had amœbic dysentery for four years with frequent relapses and no end of emetine and other treatments. In his case a hæmolytic streptococcus was isolated from the stool, and an autogenous vaccine of this organism administered together with the combined yatren treatment; he appeared to have been completely cured. On the other hand the three failures of treatment were all exceedingly resistant cases. Case 4 finally left hospital uncured; Case 6 was still positive two months after leaving hospital.

The chief trouble with combined yatren therapy in India is its very high cost. Assuming that a standard course consists of 3 pills orally a day for 10 days, with a daily rectal injection of 200 c.c. of a 2.5 per cent. solution for 10 days; then this means 30 pills in the 10 days, which costs Rs. 3-10-6, and 50 grammes in all of yatren powder, which costs Rs. 15-12-0. The combined figure, Rs. 19-6-6 per course of treatment, absolutely rules it out of court for ordinary hospital and dispensary use in India. Also the method is troublesome to the patient, and very few patients can be persuaded to continue with the rectal injections for more than five days. Even Manson-Bahr and Sayers (1927), who praise yatren very highly, it will be noted, suggest that for chronic carrier cases its use should be combined with that of "E. B. I."

The combined yatren treatment appears to be the best available for private patients in nursing homes or in the paying wards of large hospitals.

VI. STOVARSOL.

Historical.—Stovarsol was first introduced into the practice of medicine by Fournieu and Levatidi in 1922 as a prophylactic against syphilis, and for the treatment of spirochaetal infections. Chemically its constitution is said to be acetyl-oxy-amino-phenyl arsenic acid. It is a white powder, practically insoluble in water, and is stated to contain 27.2 per cent. of arsenic in organic combination. It is stated to have a marked hæmatinic action.

Marchoux (1923) appears to have been the first to test this drug in the treatment of amœbiasis. He gave it in a case of amœbic dysentery which had resisted emetine injections, in doses of 0.25 gm. in pill form twice daily. No amœbæ or cysts could be found in the stool after treatment. In a chronic case of 4 years' duration a 10-day course of treatment led to clinical cure, but cysts re-appeared in the stools 10 days later. His opinion of the drug, however, determined him to give it a more extensive trial.

Nogue and Leger (1923) gave the drug in cachets of 0.25 gm.; a course of 29 cachets in 13 days, with a break at the 4th, 8th and 12th days. Under this treatment 3 cases of acute amœbic dysentery did well, but 1 relapsed 9 days after treatment. Delanoë (1923) administered the drug in doses of 0.25 gm. twice daily to a case of 4 years' duration, which had proved resistant to emetine, "E. B. I.," and novarsenobillon treatments; the patient recovered and put on weight rapidly. Couvy (1924) records 3 cases apparently cured. Garin and Lépine (1924) record good results with the drug in the treatment of chronic amœbiasis; they give a course of 75 cgms. daily for 10 days, followed by an anti-relapse treatment of 25 cgms. every second day.

Marchoux (1924) gives a list of 59 cases, mostly of long standing that had already suffered much and varied treatment—treated by a 6 weeks' course of stovarsol. For recent cases the course consisted of 0.5 gm. stovarsol daily for 3 weeks, then 0.25 gm. daily for a further 3 weeks; for chronic cases 0.5 gm. was given on the first day; then 1 gm. every alternate day until the eighth day; then 0.75 gm. every second day for a week, reduced to 0.5 gm. daily for another week; and finally 0.25 gm. daily for the last 3 weeks. The drug was given in tablet form with meals. It is claimed that 57 of the cases were cured. Garin and Lépine (1924a) give a course of intermittent treatments; 0.75 gm. is given daily for a week, intermitted for a week, then resumed. The after-treatment consists of stovarsol every other day for 1 or 2 months. They claim that vegetative amœbæ disappear at the fourth day and cysts at the eighth day of treatment. As an alternative stovarsol treatment may be combined with emetine, in which case a course of 4 weeks' treatment is outlined.

Johns and Jamison (1925) report on 27 cases treated, including chronic and severe cases. The diagnosis was in all cases confirmed microscopically. Symptoms subsided under treatment by about the third or fourth day. Twenty of these cases were followed up for a period of 55 days; of these 16 had remained well and free from entamœbæ in the stools, 4 relapsed. Three others remained well and free from entamœbæ in the stools for 70, 74 and 99 days respectively. In the discussion which followed the reading of this paper, Gessner described the occurrence of a measles-like rash after exhibition of the drug, and Bass stated that he considered the effects of stovarsol to be superior to any previously obtainable with emetine.

In a second paper Johns and Jamison (1925a) record the results of treatment of 46 patients as eminently satisfactory. The treatment was found especially advantageous in patients with severe cardiac lesions, in pregnant women, and in young children. In a series of 27 patients, 4 were cured by 1 week's course; 16 by 2 courses with an interval of a week between them; 21 remained free from all symptoms and with negative findings in the stools for an average period of 3.8 months. They comment on the simplicity of administration of the drug. Petzetakis (1925) reports on an extensive

trial of the drug at Alexandria. Citing a number of clinical records, he believes that stovarsol is an excellent remedy for parasitic infections of the intestinal tract. It may be exhibited over prolonged periods without any ill-effects. In chronic and relapsing infections prolonged treatment is necessary, and may be supplemented by injections of emetine. In children who cannot tolerate emetine, he claims that the drug is invaluable. It is also of value as a prophylactic; a volunteer swallowed capsules containing amœbæ and cysts and was then treated with 4 tablets of stovarsol daily for 4 days. No infection resulted. Spencer (1925) reports a case of a persistent carrier, who had resisted emetine and "E. B. I." treatments; 144 grains of stovarsol were given in 12 days, and his stools after treatment were persistently negative, whilst he was in good health and free from symptoms 6 months later. A second case was one of amœbic hepatitis, which rapidly cleared up under stovarsol therapy. A third was one of amœbic dysentery in a child aged 2½, where 2 courses of stovarsol were necessary to eradicate the infection.

Manson-Bahr and Morris (1925) record 2 cases of carriers, where "E. B. I." treatment had failed, apparently cured by stovarsol, with negative findings in the stools after treatment. To avoid toxic symptoms from the drug, they recommend that the dosage should not exceed 2 tablets (8 grains) daily for 7 days, or 1 tablet (4 grains) daily for 14 days. A second paper by Johns and Jamison (1925a) appears to deal with the same series of cases as in their first (1925) paper. They note the occurrence of rashes in two patients to whom stovarsol was administered. Rivero (1925) records six cases of dysentery, of which five were apparently cured by stovarsol treatment; the sixth patient, suffering from both malaria and dysentery, died in spite of stovarsol and emetine treatment. Newnan and Davis (1926) give the following table comparing results with emetine and stovarsol respectively:

	Emetine hydrochloride.	Stovarsol.
Cases treated ..	9	9
Relapses ..	1	3
Deaths ..	1	0
Average number of days in hospital; uncomplicated cases.	17.6	16.0
Average number of days to clearing up of symptoms.	8	4.5
After-effects ..	Inappreciable	Distinctly tonic.
Approximate cost per course of treatment.	Rs. 3-0-9	Rs. 4-4-4

Their test for cure was systematic examination of the stools for 25 days after the cessation of treatment, and they conclude that it is possible that a combination of the two drugs may be the best method for the treatment of amœbic dysentery.

P. W. Brown (1926) considers that stovarsol is more effective in eradicating the parasite than emetine. He considers that cases where ulceration of the rectum has occurred are those most liable to relapse. van den Branden (1925) did not have too good results with stovarsol; he treated 8 cases; of these 2 relapsed a few days after the completion of treatment; in another 4, parasites were still present; in 2 both symptoms and amœbæ disappeared. He thinks it may be best to combine emetine and stovarsol treatments. van Steenis (1927) finds stovarsol less effective than emetine or yatren, but very useful against the "minuta" type of *E. histolytica*. It was given in doses of 250 mgm. 3 times daily for 1 week, then in diminishing doses for another 2 months. No toxic effects were noticed. Houssian and Duwez (1927) advocate the treatment of relapses by combined treatment, either with emetine plus stovarsol, or emetine plus yatren, and recommend stovarsol treatment for the layman out of reach of medical aid. Seibert (1927) reports the trial of stovarsol on a series of 300 cases, together with emetine. Stovarsol was given orally in doses of 0.25 grm., t.i.d., together with an

injection of emetine gr. 2|3rds b.d. for 7 days. All medication was then stopped for 3 days, followed by salts every morning for 6 days, and daily examination of the stools. If the stools were negative for 7 days, the patient was discharged with the recommendation to have a further specimen examined 60 days later. If the stools were positive, a second course of stovarsol (usually without emetine) was given. He records that the results in this series were very much better than with "E. B. I." Four patients out of over 300 treated with stovarsol showed a mild rash.

Sautet (1927) finds stovarsol lethal to *E. histolytica* in culture within 24 hours at a dilution of 1 : 600, and notes that it appears to be more active in the presence of liver extract than when added directly to the cultures.

In summing up this series of papers, it will be seen that on the whole results with stovarsol are not too bad. Almost every writer comments on the method as one easy to administer and well tolerated by the patient. On the other hand, it would appear to be a less effective amœbicide than emetine, and some of the authors comment on its toxicity. Certain cases of acute exfoliative dermatitis have been recorded in the literature as following on the administration of stovarsol.

RESULTS IN CALCUTTA.

Thirty-two patients were treated with stovarsol. None of these patients had blood in their stools on admission to hospital, but 24 of them had suffered from chronic amœbic colitis; the 8 others were carriers admitted for the treatment of diseases other than amœbiasis. Details are given in Table VI. The results were as follows:—

Cases treated, 32.

Probable cures, 8 (Nos. 10, 13, 18, 19, 20, 22, 27 and 30).

Failures of treatment, 9 (Nos. 8, 9, 14, 17, 24, 25, 26, 28 and 29).

Indeterminate, 15 (Nos. 1, 2, 3, 4, 5, 6, 7, 11, 12, 15, 16, 21, 23, 31 and 32).

The ratio of probable cures to failures, 8 : 9 or 1 : 1.1 is a relatively high one, and we regard stovarsol as definitely having a place in the treatment of chronic amœbiasis. After treatment, 8 stools were positive and 109 negative; a ratio of 1 : 13.6, which shows a greater degree of eradication than with any other drug tried. We have been very much struck with the ease and simplicity of this treatment; one of the 4 grain tablets is given each night and morning for 10 days. In none of our patients were there the slightest toxic symptoms, whilst the drug appears to be of special value as a hæmatinic, and patients on stovarsol therapy are not the miserable unhappy beings who are trying to keep down "E. B. I." or being injected with emetine. We have had reported to us one case of a measles-like rash following the administration of this dosage by a medical practitioner in Calcutta, and there are several instances in the literature where the drug has caused exfoliative dermatitis. It is clear therefore that the patient should be warned to report the appearance of any rash, however mild, or any ocular symptoms; and at once to discontinue the treatment if such occur. The retail cost

of a bottle of 28 of the 4-grain tablets in Calcutta is Rs. 3-4-0; so the average cost of a 20-tablet treatment works out at Rs. 2-5-2.

It is particularly in the chronic type of case that stovarsol is useful, and it would appear that it offers the patient about a 40 per cent. to 50 per cent. chance of eradication of the infection. It is a drug which is suitable for use in out-patient work and in dispensaries in the field.

The senior author is accustomed to prescribe the 10-day course of stovarsol outlined above *especially as an after-treatment*. In cases of amœbic dysentery, clinical relief of the symptoms is first obtained by the use of emetine injections with Deeks' bismuth treatment; a few days are then allowed to pass for the elimination of all emetine from the system; and the patient is then put on the 10-day course of stovarsol. This usually leads to a rapid improvement in his general condition, and may eradicate the infection. For chronic carriers our usual treatment has been first a course of "E. B. I." treatment; then an interval of a few days; then a course of stovarsol.

It may ultimately prove to be the case that the arsenical compounds are of more value in eradicating infection with *E. histolytica* than the ipecacuanha derivatives; at least they deserve further investigation. On the other hand a drug, which definitely fails to eradicate the infection in 9 out of 32 patients treated, leaves one desiring something better and much more certain in its action.

VII. KURCHI AND ITS ALKALOIDS.

Historical.—The use of the bark and seeds of *Holarrhena antidysenterica* in the treatment of the dysenteries of India dates very far back into ancient days; and is a special feature of the indigenous systems of medicine. Tull Walsh (1891) refers to the use of the bark (the so-called kurchi) as being approximately equal in its effects to emetine mercuric iodide, and draws attention to previous publications on the use of the drug in 1880 and 1881. The latter paper is one by R. C. Datta (1881), who records clinical cure of 7 cases of dysentery, 5 of them acute, and 2 chronic cases of old standing by the administration of 1 dr. doses t.i.d. (The 1880 paper is unfortunately not available.)

It appears to be used in the indigenous systems in two forms: as kurchi bark, either in powder or aqueous extract (extract kurchi liquidum); or as *indra jau*, an emulsion of the seeds. Unfortunately neither preparation makes any pretence to standardisation. The one claim that can be made at once for the kurchi treatment is that it is a very cheap one. Its efficacy, however, remains to be determined.

H. C. Brown (1922) appears to have been the first worker to test the power of the chief alkaloid of kurchi—conessine—as an amœbicide. Working with cultures of pond amœbæ, he found conessine to be distinctly lethal to these amœbæ, and that when it was incorporated with the culture-medium at a strength of 1:1,000,000 it inhibited their growth. Experiments with mice showed it to be 50 per cent. less toxic than emetine, but its subcutaneous administration in medicinal doses produced local necrosis. On the other hand, he found that it can be safely given by the mouth in large doses. Henry and Brown (1923), on testing the tannins of kurchi bark

and of ipecacuanha against the free-living ciliate protozoön, *Glaucoma*, found both to be highly toxic to this ciliate. Drake-Brockman (1926) speaks well of kurchi as a useful adjuvant in the treatment of chronic amœbic dysentery.

The pharmacological action of conessine has been fully studied by Chopra, Gupta, David and Ghosh (1927). They found it to be lethal to *Paramœcium caudatum* in a dilution of 1:2,800 of its molecular weight, and in a dilution of 1:20,000 in the presence of N/200 NaOH. It killed free-living amœbæ at a dilution of 1:1,000 and in the presence of N/200 NaOH at a dilution of 1:280,000. Its action on the vegetative forms of *Entamœba histolytica* was tested on the dysenteric stools of experimentally infected kittens. In mucous flakes in such stools it killed the motile amœbæ in dilutions of 1:280,000 in 8 minutes in the presence of an alkali, and in 18 minutes in the absence of alkali. Emetine in dilutions of 1:200,000 was found to be inactive against the amœbæ, but killed them if alkali was present. Conessine had but little action upon *Trichomonas hominis*, but was markedly lethal to the coprozoic flagellate protozoön, *Bodo caudatus*. Conessine salts can be given subcutaneously and intramuscularly, but intravenous administration is dangerous, owing to their action on the auriculo-ventricular bundle. Contrary to what was reported by Brown, these workers found that no necrosis of the tissues followed its hypodermic injection. In dilutions of 1:120,000 it has no effect on the perfused mammalian heart. Although the alkaloid has a markedly narcotic action on frogs, it has no marked effect on the central nervous system of mammals. These workers accordingly suggest the treatment of amœbic infections, either by oral administration of kurchi extract, or by subcutaneous administration of either conessine hydrochloride or of the hydrochloride of the total alkaloids of the bark. In addition to the alkaloid conessine, Ghosh and Ghosh (1928) have recently shown that two alkaloids, kurchine and kurchicine are also present in the bark.

RESULTS IN CALCUTTA.

(i) *Kurchi orally.*—In this series, details of which are given in Table VII, 16 patients were treated. Of these 4 had blood in the stools on admission; 8 were cases of chronic amœbic infection; and 4 were carriers admitted for diseases other than amœbiasis. Six were treated with "Tabloid" Extract Kurchi Corticis (B. W. & Co.) and ten with extract kurchi liquidum purchased locally and made in Calcutta by different firms. The results were as follows:—

Cases treated, 16.

Probable cures, 7 (Nos. 1, 2, 3, 6, 10, 11, and 13).

Failures of treatment, 8 (Nos. 4, 5, 7, 9, 12, 14, 15 and 16).

Indeterminate, 1 (No. 8).

The ratio of probable cures to failures, 7:8 or 1:1.1, is surprisingly high for so simple a remedy. After treatment 8 stools were positive and 57 negative: a ratio of 1:7.1.

The treatment is simplicity itself, and none of the patients showed any toxic symptoms. With the "Tabloid" product the dose could be pushed to 60 grains a day without discomfort. With the bazaar liquid extract 10 drs. a day can be given (2 drs. five times a day) for 10 days on end without the patient complaining of any symptoms. In the treatment of actual dysentery the improvement is

less rapid than with emetine, but cure appears to be much more permanent. It is rather curious that this finding of ours in 1928 should confirm that of Tull Walsh in Calcutta in 1891. *Plus ce change, plus c'est la même chose.*

(ii) *Conessine intramuscularly.*—Lieut.-Col. R. N. Chopra, I.M.S., Professor of Pharmacology, Calcutta School of Tropical Medicine, very kindly placed at our disposal a freshly prepared sample of conessine hydrochloride, and 9 patients were treated with this drug. At first we gave it in gr. i doses daily, intramuscularly, but as this was very well tolerated, with the last two patients we pushed the drug to gr. i twice daily (giving the injections into one deltoid, one buttock, the other buttock, and the second deltoid in turn). Throughout the whole series of injections the drug was very well tolerated, and no local or general toxic reactions were noted. Details are given in Table VIII.

The results with conessine, to date at least, are rather disappointing, in view of the finding by Chopra, Gupta, David and Ghosh (1927), that the drug is very lethal to *Entamoeba histolytica* in vitro. We are still continuing the trial of the drug, however. The preparation is very hygroscopic, and ready prepared ampoules would be preferable to a powder which has to be weighed out and dissolved. Of the 9 patients, 3 were passing blood in the stools on admission, 4 were cases of chronic amœbic colitis, and 2 were carriers admitted for diseases other than amœbiasis. The results may be summarised as follows:—

Cases treated, 9.

Probable cures, 3 (Nos. 1, 2 and 3).

Failures of treatment, 6 (Nos. 4, 5, 6, 7, 8 and 9).

This gives a probable cure: failure ratio of 3:6 or only 1:2, which is a very poor figure. After treatment 6 stools were positive against 36 negative: a ratio of 1:6.

Case 9 in this series is of considerable interest. After treatment he appeared to be very fit, and examination of 10 consecutive stools had negative results. Ordinarily, one would have thought that this patient was cured. He now commenced to pass blood in the stools again, however, and at the 11th examination motile *E. histolytica* were found. This case emphasises that the "cures" referred to in this paper are relative rather than absolute.

It is curious that intramuscular injections of conessine should yield far worse results than simple oral administration of extract of kurchi. As mentioned above H. C. Brown (1922) found conessine to be an active amœbicide to free-living amœbæ; but Henry and Brown (1923) also found the tannins of kurchi bark to be highly toxic to free-living protozoa. When kurchi extract is administered by the mouth the action of both conessine and the tannins appears to come into

play, and results are better than after intramuscular injections of conessine.

(iii) *Total alkaloids of kurchi.* Colonel Chopra has also placed at our disposal the hydrochloride of the total alkaloids of kurchi bark. Up to date we have only treated two patients with this preparation, giving it intramuscularly in doses of gr. i twice daily. Details are given in the second half of Table VIII. In both cases the injections were very well tolerated, but both proved to be failures of treatment; in fact this preparation appears to be even less useful than conessine.

Our results to date with kurchi and its alkaloids are insufficient to warrant any definite conclusions, and a further investigation with the drug is badly needed. Kurchi is extremely cheap; it is available in bulk in India, and its alkaloids can be readily extracted. Should it prove to be efficacious in the treatment of intestinal amœbiasis, it might well become the standard treatment in India. In addition to conessine hydrochloride and the hydrochloride of total kurchi alkaloids, Colonel Chopra has now very kindly placed at our disposal a standardised liquid extract of kurchi, with which we hope to carry out further trials.

VIII. COMBINED TREATMENTS.

In view of the fact that all the remedies at present on the market appear to act only as very weak amœbicides, the exploration of the possibilities of combined treatments is obviously one which demands attention. We hope to investigate this possibility later, but our few results to date are given in Table IX.

(i) *Emetine plus kurchi.*—Nine patients were treated by injections of emetine, gr. i daily for six days, together with large doses of extract kurchi liquidum by the mouth. Of these 1 was passing blood in the stools on admission, 7 were cases of chronic amœbic colitis, and 1 a carrier. The results were as follows:—

Cases treated, 9.

Probable cures, 3 (Nos. 5, 7 and 8).

Failures of treatment, 3 (Nos. 3, 6 and 9).

Indeterminate, 3 (Nos. 1, 2 and 4).

The ratio of probable cures to failures of treatment, here 3:3 or 1:1, is not too good, but perhaps insufficient emetine was given, and a 9-day course might give better results. After treatment the ratio of positive to negative stools was 3:28 or 1:9.3, which appears to indicate a considerable degree of eradication of the infection. The cost of a course of 9 grains of emetine, with 10 drs. daily of liquid extract of kurchi, would be approximately Rs. 4-9-3.

This line of treatment, at least for cases where active dysentery is present, appears to be worth further investigation. Case 7 in Table IX of this series was a most inveterate carrier, who had resisted treatment with

TABLE VIII.
Concussine Injections.

o.	Name.	Caste.	Sex.	Age.	Disease for which admitted.	Previous intestinal history.	Previous treatment.	Findings in stool on admission.	Treatment.	Findings in stool after treatment.	REMARKS.
1.	S. S.	H.	M.	14	Filariasis	....	....	Veg. <i>E. histolytica</i> . <i>E. nana</i> cysts.	Concussine injection, gr. i daily for 9 days.	5 examinations. Negative.	
2.	J. N.	H.	M.	..	Dysentery *	Dysentery 5 years previously, followed by relapsing diarrhoea.	1 course of emetine injections.	Veg. <i>E. histolytica</i> . <i>E. nana</i> cysts.	Concussine injection, gr. i daily for 9 days.	7 examinations. Negative.	
3.	L. K.	M.	M.	25	Kala-azar	....	....	Veg. <i>E. histolytica</i> .	Concussine injection, gr. i daily for 9 days.	5 examinations. Negative.	
4.	J. W. C.	A. I.	M.	39	Diarrhoea	....	....	Veg. <i>E. histolytica</i> . <i>Giardia</i> cysts.	Concussine injection, gr. i daily for 6 days.	2 examinations. Veg. <i>E. histolytica</i> at 2nd. C. L. crystals. <i>Giardia</i> cysts.	Then put on emetine.
5.	P. C. D.	H.	M.	38	Diarrhoea	4 months' duration, with much tenesmus.	....	Veg. <i>E. histolytica</i> .	Concussine injection, gr. i daily for 9 days.	<i>E. histolytica</i> : veg. and cysts.	Then put on Alcresta ipeca
6.	R. J.	M.	M.	45	Abdominal colic	1 month's duration.	....	<i>E. histolytica</i> : veg. and cysts.	Concussine injection, gr. i daily for 9 days.	4 examinations. <i>E. histolytica</i> cysts at 4th.	Then put on "E. B. I."
7.	H. K. P.	H.	M.	30	Chronic dysentery. *	3 attacks in 3 years.	Emetine injections. Stovarsol. Yaten orally.	Veg. <i>E. histolytica</i> . C. L. crystals.	Concussine injection, gr. i daily for 9 days.	6 examinations. Veg. <i>E. histolytica</i> at 6th.	Then put on emetine.
8.	C. M. K.	H.	M.	26	Colitis	4 months' duration.	....	Veg. <i>E. histolytica</i> .	Concussine injection, gr. i, b.d. for 6 days.	<i>E. histolytica</i> cysts	Then put or kurchi orally.
9.	J. T.	M.	M.	50	Dysentery *	12 days' duration.	....	Veg. <i>E. histolytica</i> .	Concussine injection, gr. i, b.d. for 6 days.	11 examinations. Veg. <i>E. histolytica</i> at 11th examination.	Then put or kurchi orally.

Kurchi Total Alkaloid Injections.

o.	Name.	Caste.	Sex.	Age.	Disease for which admitted.	Previous intestinal history.	Previous treatment.	Findings in stool on admission.	Treatment.	Findings in stool after treatment.	REMARKS.
10.	H. G. L.	A. I.	M.	42	Lymphangitis	....	....	<i>E. histolytica</i> cysts	Total alkaloid injections. 12 grs. in 6 days.	<i>E. histolytica</i> cysts	
11.	B. K.	H.	M.	42	Dysentery *	....	....	Veg. <i>E. histolytica</i> .	Total alkaloid injections. 12 grs. in 6 days.	3 examinations. <i>E. histolytica</i> cysts + at 3rd.	

emetine, yatren, and stovarsol, and had had repeated relapses during a period of one year. Her condition cleared up at once on the combined emetine and kurchi treatment; 8 stools, one a week for 8 weeks, gave negative results, and she is now, two years later, in excellent health. Case 8 was very similar, but could only be followed up for ten days.

(ii) *Emetine plus stovarsol*.—Five patients were treated by emetine injections combined with stovarsol orally. These consisted of 1 case of active dysentery, 2 of amoebic colitis, and 2 carriers. The results of treatment were: were:

Cases treated, 5.

Probable cures, 2 (Nos. 3 and 5).

Failures of treatment, 0.

Indeterminate, 3 (Nos. 1, 2 and 4).

It is to be noted that in none of the 20 stools examined after this course of treatment was any form of *E. histolytica* found.

The number of cases observed is of course too small to justify any conclusion, but this line of treatment certainly deserves further investigation. Cases 3 and 5 in this series were cases of very chronic and relapsing amoebic dysentery, and appeared to clear up at once with the combined treatment. The cost of a course of 9 grains of emetine and 18 tablets of stovarsol, given in 9 days, would be approximately Rs. 5-1-7.

(iii) *Emetine plus yatren*.—Only one patient received treatment by injections of emetine combined with yatren by the mouth. He appeared to have been cured, though he was a very chronic and old standing case.

The possibility of efficient cure with one or other of the combined treatments certainly deserves further investigation.

DISCUSSION.

A summary of our results is given in Table X. Whether we consider them or the analysis of the literature previously given in this memoir, we are bound to admit that the present-day treatment of chronic intestinal amoebiasis is profoundly disappointing. The medical practitioner of the present day in fact is in a worse position than his predecessor of a century ago. In that day remedies were few and drastic, whilst ignorance as to the causes of dysentery did not prevent by way of treatment the application of "the method of trial and error." To-day, thanks to the work of Sir Leonard Rogers, Dobell, Wenyon and O'Connor, Fletcher and Jepps, W. M. James, Manson-Bahr, and others, our knowledge of the pathology of chronic intestinal amoebiasis is fairly extensive; yet from amongst a whole host of supposed "cures" for the condition there is not one that appears to be really efficacious or reliable.

We have seen that the degree of severity of symptoms in a person infected with

E. histolytica may vary very widely, from the almost symptomless carrier state to acute amoebic dysentery, with extensive ulceration of the colon. This variation may be due to one of two principal causes:

(a) Variation in the resistance of different individuals to the inroads of the parasite. To this possibility we shall return later.

(b) Variation in the tissue-attacking power of the parasite.

Let us take up this latter question first. It is likely that various strains of *E. histolytica* may vary widely in their capacity for attacking and dissolving tissue. This has been especially emphasised by Brumpt (1925, 1926). He goes so far indeed as to distinguish two species of entamoebæ, which have a practically identical morphology, and produce tetranucleate cysts—*Entamoeba dysenteriae*, which is pathogenic and gives rise to amoebic dysentery and the symptoms of amoebiasis, and *Entamoeba dispar*, which is not pathogenic. Dobell (1926) vigorously and in our opinion rightly criticises this as unsound. He quotes the work of Walker (1913) which showed that experimental infection with the same strain of *E. histolytica* may give rise to amoebic dysentery in one man, but not in another.

Now the classical work of Boeck and Drbohlav (1925), subsequently fully confirmed by many workers, has shown that in culture *E. histolytica* takes to feeding on bacteria, although in full vigorous activity. W. M. James (1925) writes as follows: "It is of great interest to me to learn through a recent letter from Professor Dobell that he has revised his opinion that *E. histolytica* is always a tissue parasite. He is now convinced that it can occur in the large intestine without tissue penetration. In other words, a latent infection does not necessarily mean ulceration of the bowel, but is capable of establishing an ulcerative process at any time."

It is becoming increasingly clear, indeed, that in some carriers the entamoebæ may live in the lumen of the gut (where they presumably feed upon bacteria) and never invade tissues. Such infections would be unaccompanied by any symptoms, and would be likely to be transient ones. Above all they should prove exceedingly amenable to treatment.

In our series of cases the following appear to be instances of this state of affairs:—

(i) Table I, Case 5; a case of tabes dorsalis in an *E. histolytica* carrier; the carrier condition rapidly, and apparently permanently cured by alcresta ipecac.

(ii) Table IV, Case 17; a patient with filariasis, who was a dysentery carrier. Rapid and apparently permanent cure followed a 10-day treatment with "E. B. I."

(iii) Table VI, Case 10. A carrier with a gastric ulcer. Rapid and apparently perma-

nent cure followed a course of stovarsol administration.

On the other hand; the proportion of carriers who are absolutely free from any symptoms which can be attributed to the infection in the gut is small, and it is evident that this state of affairs must be the exception, rather than the rule.

At the other end of the scale, it would appear that the amœbæ are more susceptible to treatment when actual dysentery is present, than when it is not. When actual dysentery is present, although the amœbæ are innumerable and in full pathogenic activity, yet the gut is hyperæmic, and any drug which is present in the blood-stream will have ready access to the amœbæ. Examples of what was apparently complete eradication of the infection from patients who were suffering from acute amœbic dysentery at the time, are as follows:—

(i), (ii), (iii) Table II. Cases 3, 4, and 15; treated with emetine injections only.

(iv), (v) Table III, Cases 1 and 18; treated with emetine injections and bismuth orally.

(vi) Table V, Case 1; treated with yatren orally. Also Case 1 in the series treated with yatren orally and per rectum.

It is the intermediate group of cases which are so extremely resistant to any form of treatment. A glance down the columns headed "Previous intestinal history" shows the state of affairs present in these patients. They get relapse after relapse, and their general health steadily deteriorates. Here there is often considerable thickening and fibrosis of the gut wall, the entamœbæ are walled in by fibrous tissue, there is anæmia rather than hyperæmia of the gut, and the chances that any weak amœbicide under such conditions will eradicate the infection are very poor. In this condition it would appear that eradication of the infection only takes place when the drug induces sufficient irritation of the mucosa of the colon to cause all the amœbæ to be shed. Instances of this state of affairs are:

(i) Table IV, Case 2. Cured by 30 grains of "E. B. I." in 10 days.

(ii), (iii) Table V, Case 2. This patient had suffered from chronic relapsing amœbic dysentery for eight years. He was apparently completely cured by 9 pills of yatren daily for 7 days, followed by 3 pills daily for 10 days. Case 23 of the same table is a similar instance.

(iv), (v) Table VII, Cases 2 and 10; treated with kurchi orally.

(vi) Table VIII, Case 2; treated with conessine.

The difficulty of eradicating a chronic infection with *E. histolytica* is such that we know three medical men who are infected, and who

have "given it up," so to speak. They carry on until some abdominal disturbance sets in, when they have a sufficient number of injections of emetine to alleviate the symptoms, and then carry on till the next recurrence. Such a policy, however, is one of despair, and a "*histolytica*-emetine life"—if we may coin the term—a most uncomfortable one.

The question may be asked: "If the patient is infected and shows but few symptoms, is it worth while attempting to eradicate the infection? Why not let it alone unless or until symptoms set in?" The answer to that question we believe lies in the column "Previous intestinal history" in the tables in this paper. We agree with Boyers, Kofoid and Swezy (1925) in their statement that the usual course of events in a carrier of *E. histolytica* is a progressive deterioration in health. The symptomatology of the carrier state is fully discussed elsewhere (Acton and Knowles, 1928, p. 125), and we need not here expatiate on it. The carrier is always a potential danger, both to himself and to others, and in our opinion the need for the discovery of some easily administered, ready, really efficacious, and yet cheap cure for the carrier state is most urgent. We consider that whenever the carrier state is present, every attempt should be made to eradicate the infection.

On the other hand, there are those who "darken counsel by words without knowledge," and we would deplore the present-day tendency of some manufacturers to flood the market with an ever-increasing number of new "cures." Such a policy does not help the medical man; it only makes matters worse for him.

To turn to the other side of the picture, the writers—at least—are coming more and more to believe that the final eradication of the infection may perhaps be more easily effected by raising the patient's general resistance than by the use of a weakly amœbicidal drug.

We seem to know a very great deal about the pathology of intestinal amœbiasis, but—to look the matter squarely in the face—is there not as yet a vast and unexplored territory awaiting investigation?

Why does *Entamœba histolytica* in one person cause amœbic dysentery, and in another few or no symptoms? Why does an infected person sometimes remain free from symptoms over long periods, and then pass into a condition of relapsing dysentery which may last for months or years, and may then apparently spontaneously recover? What, in brief, are the conditions which lead to the assumption of pathogenicity on the part of the amœba?

It is along this line of investigation, we believe, that investigation should be pushed. Instead of turning out numerous new drugs

of weak amœbicidal activity, let us try and understand the how and the why of chronic intestinal amœbiasis. Other factors than the amœbæ are concerned in this state of affairs.

The surface only of this problem has so far been scratched. Oliver (1924) notes that the treatment of intestinal amœbiasis in Mesopotamia was more successful during the hot weather than in the winter. Is this possibly associated with a lower endocrine rate of metabolism during the cold weather, leading to a loss of resistance on the part of the patient? Knowles, Napier and Das Gupta (1923), and Acton and Knowles (1924) have shown that in acute amœbic dysentery the stool is usually markedly acid, in fact is usually acid to blue litmus-paper. Is the hydrogen-ion concentration of the contents of the colon, or of the colon mucosa a factor which helps to determine whether the amœba becomes pathogenic or not? Is achlorhydria or hyperchlorhydria a determining factor in the assumption of pathogenicity by the amœba? Vogel (1927) notes the special association of a Gram-positive diplococcus with acute amœbic dysentery. Knowles (1928, p. 48) notes the association of a markedly hæmolytic streptococcus with fatal experimental amœbic dysentery in kittens. Dobell and Laidlaw (1926a), in their cultural work on *E. histolytica*, isolated a "Bacillus No. 1" which appeared to be particularly favourable to the excystation and growth of *E. histolytica*. It had the typical cultural characters of the bacillus of Shiga, but did not agglutinate with the specific high titre serum. "Bacillus III," which corresponded to typical *B. lactis aërogenes*, was definitely inhibitory to all the amœbæ tested, and "Bacillus IV" to the growth of *E. histolytica*. The same authors also note the extremely favourable action of certain grades of rice starch on cultures of *E. histolytica*. "The effect of adding solid starch to a culture of *E. histolytica* is often, indeed, astonishing. Within 24 hours a previously poor culture is teeming with amœbæ—most of them gorged with starch-grains in various stages of digestion," they write. The optimum temperature for culture was 37-38°C. and if the cultures were cooled to 30°C. the amœbæ rounded up and gradually died. The amœbæ grew best in media which were of neutral reaction; and acid and alkali alike were harmful. Changes in the viscosity of the medium did not appear to affect the growth of the amœbæ. Partial anaërobiosis did not kill the cultures. The amœbæ appeared to be but little affected by changing the salt-content of the medium. Small particles of sulphur and of cellulose were ingested by *E. histolytica*, but neither affected the cultures in any way.

This memoir of Dobell and Laidlaw's constitutes an important first step in the direc-

tion of studying the influence of its environment on the vegetative forms of *E. histolytica*, and such a line of investigation should be pushed, for its results may have a most important bearing on the treatment of intestinal amœbiasis.

Sellards and Leiva (1923a) have emphasised the importance of stasis of the gut contents and a fluid condition of the contents of the colon in inducing excystation of *E. histolytica* in experimental kittens; and it is possible that the same two factors may have an important bearing on the setting in of amœbic dysentery in a carrier. Acton and Knowles (1928) draw attention to the fact that in amœbic dysentery and in the carrier state with symptoms, the bacterial flora of the stools seems to be entirely changed from the normal. On a McConkey plate in such cases one gets large numbers of very fine dewdrop-like colonies. These consist chiefly of enterococci, which may or may not be lactose fermenters, and many strains of which are virulently hæmolytic; also fine types of yeasts. Another organism which is frequently present corresponds to *Staphylococcus mollis*, and this frequently has hæmolytic powers.

We would urge that what is wanted now is not to flood the market with new and weak amœbicides, but to carry out a thorough and complete investigation of the conditions under which a "healthy" carrier goes down with amœbic dysentery; in other words the factors which make for pathogenicity on the part of the amœba. This may involve gastric analyses, determinations of the hydrogen-ion content of the stools (and, if possible, of the fresh contents of the colon) in normal persons and in patients suffering from amœbic dysentery, and work with experimentally infected kittens. We know a great deal about the pathology of intestinal amœbiasis; we know scarcely anything however about its pathogenesis. It may be possible that some quite simple measure may render the colon inhospitable to the amœbæ, in which case the carrier would probably cure himself.

Even if the carrier does succeed in curing himself, however, he is always liable to re-infection when he goes back to the same environment in which he first contracted the infection. Dunn (1927) writes feelingly on this point: "Even prolonged treatment is more or less hopeless; for when one realises that 40 per cent. of the Chinese have amœbic cysts in their stools, it means that you and I have at least one servant handling our food from day to day, who is continually re-infecting us. One might eradicate cysts after six months' treatment, only to be re-infected a few days later. So, again, we, who live in the East, must look toward some prophylactic treatment as our ultimate hope." This author draws special attention to the necessity for securing an adequate supply of

vitamines in the patient's diet. "I put the patients on full diet," he writes, "rich in vitamins, and almost like magic they commence to gain weight, and all symptoms disappear."

SUMMARY AND CONCLUSIONS.

The patients dealt with in this paper numbered 154, and 220 treatments were administered to them. Whilst the series include many patients who were suffering from amœbic dysentery on admission, the great majority were cases of chronic and relapsing intestinal amœbiasis, together with some "healthy" carriers. Unfortunately the impossibility of following up patients discharged from hospital in civil life rendered the enquiry almost nugatory. On the other hand, such results as have been obtained may perhaps be expressed in terms of the relative ratio of "probable cures" to certain failures of treatment; and, with regard to the sterilising influence of the drug on the amœbic infection present in the gut, in terms of the relative ratio of the number of negative to positive stools after treatment.

The results obtained are summarised in Table X. With regard to the different individual remedies tested:

(1) "Alcresta ipecac." gave a ratio of probable cures to failures of 1: 1.3, and of positive to negative stools of 1: 7.

(2) Emetine injections (alone) gave corresponding ratios of 1: 1.7, and of 1: 7.

(3) Emetine injections plus "Panama bismuth" gave ratios of 1: 1.8, and 1: 8.7. The addition of large doses of bismuth appears—clinically at least—to improve the chances of eradication.

(4) Emetine bismuth iodide (chiefly administered to carriers) gave ratios of 1: 3.5 and 1: 6.5. (Possibly it was not given in sufficient doses or for a sufficiently long period.)

(5) Yatren given orally gave ratios of 1: 1.3 and 1: 8. With the combined method of yatren orally and yatren per rectum (on the few cases tested) results did not seem to be much better.

(6) Stovarsol appears to be of definite value in the treatment of chronic intestinal amœbiasis. The ratio of probable cures to failures was as 1: 1.1, and of positive to negative stools after treatment as 1: 13.6. This treatment is also of value for its hæmatinic effects.

TABLE X.

Summary of Results in Calcutta.

Treatment.	No. of cases treated.	Probable cures.	Failures of treatment.	Indeterminate.	Ratio. Probable cures: Failures.	Ratio +ive stools: -ive stools after treatment.	Approximate cost of treatment.
Alcresta ipecac. ..	7	3	4	0	1 : 1.3	1 : 7	Rs. 3-2-4
Emetine injections (only).	32	6	10	16	1 : 1.7	1 : 7	" 2-7-6
Emetine injections plus "Panama bismuth."	55	9	16	30	1 : 1.8	1 : 8.7	" 4-9-4
"E. B. I." ..	23	2	7	14	1 : 3.5	1 : 6.5	" 3-5-4
Yatren orally ..	23	6	8	9	1 : 1.3	1 : 8	" 3-10-6
Yatren combined orally and per rectum.	6	2	3	1	1 : 1.5	1 : 6.2	" 19-6-6
Stovarsol ..	32	8	9	15	1 : 1.1	1 : 13.6	" 2-5-2
Kurchi orally ..	16	7	8	1	1 : 1.1	1 : 7.1	" 1-2-1
Conessine or total kurchi alkaloids by injection.	11	3	8	0	1 : 2.7	1 : 4.8	....
Combined treatments.	15	6	3	6	2 : 1	1 : 18	From " 4-8-0 to 5-1-7
TOTALS ..	220	52 = 23.6%	76 = 34.5%	92	1 : 1.5	1 : 8.7*	

* As calculated on 752 stools examined after the cessation of treatment.

(7) The simple administration of kurchi orally gave surprisingly good results; the ratios being 1: 1.1 and 1: 7.1 respectively.

(8) On the other hand results with the hypodermic administration of conessine hydrochloride or of the hydrochloride of the total alkaloids of kurchi bark seemed to be worse than those with kurchi orally. Possibly in the oral administration of kurchi, the action of the tannins on *E. histolytica* is of value.

(9) Of the different combined treatments tried the simultaneous injection of emetine and administration of stovarsol orally appeared to give the best results. Further investigation on the possibilities of combined treatments is much wanted.

Our findings, together with a study of the previous literature, lead us to the conclusion that these drugs are *weak* amœbicides, and that a policy of placing an increasing number of them on the market is going to confuse the issue, rather than clarify it. The medical practitioner, at the moment, does not know where he is, and a study of the literature and advertisements does very little to help him.

We would urge the necessity, at this juncture, for a thorough investigation of the rôle of the secondary factors in the causation of amœbic dysentery, and of the influence of its environment on the pathogenicity of *Entamoeba histolytica*.

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Current Topics.

The Cause and Treatment of the Crisis in Lobar Pneumonia.

By ALEXANDER CANNON, M.B., Ch.B. (Leeds).
(*Brit. Med. Journ.*, April 21, 1928.)

THIS writer's suggestions for the administration of oxygen in pneumonia are worthy of note:—

There is a very small point which is of great importance in the use of oxygen in pneumonia, and is the secret of the success which has followed my treatment of all pneumonia cases: the oxygen should be used warmed. In the past, the use of oxygen has been the cause of more deaths in pneumonia than one cures to contemplate, simply because it was administered cold and not warmed to the required temperature; hence the lungs were chilled and the patient could not stand the

shock. The oxygen should be heated by passing the gas through coiled Litré's tubes immersed in a water-bath kept at a temperature of about 120°F., the gas being passed through the tube at a slow rate, which is gauged by the comfort of the patient, who breathes quietly and does not complain of the "choking" feeling which occurs when the gas is administered too quickly. By keeping a thermometer in the tube it was found that the temperature of the gas passing through at this very slow rate was about 99°F. when the water-bath registered 120°F. One thing to watch is the risk of sudden collapse when the crisis occurs; this can fortunately be avoided by the daily administration of pituitrin, 1/2 c.cm. being administered hypodermically morning and night, the heart action being safeguarded by the old-time proven remedy of digitalis administered from the onset of the disease; the omission of this has been responsible for the loss of many a case of pneumonia.

Danger of Intravenous Calcium Therapy.

(*Brit. Med. Journ.*, April 21, 1928, p. 662.)
Observations.

IN the first experiment, when 50 c.cm. of a 1 per cent. solution of calcium chloride was injected intravenously, an electro-cardiogram before, during, and for eight minutes after injection was taken. No subjective or objective symptoms beyond the normal were observed in the subject of experiment. The electro-cardiogram showed no changes from the normal during and following the injection other than a slight increase in the heart rate during the period in which the needle penetrated the skin.

The second experiment, in which 4 c.cm. of a 10 per cent. calcium chloride solution was injected intravenously, was more productive of results. When 2 c.cm. of the solution had been injected the subject experienced a sensation of warmth over the entire body, accompanied by slight headache and a feeling of fullness in the head. It was decided to continue the injection. Dizziness occurred during the period of injection of the second 2 c.cm., and this was closely followed in the course of the next three seconds by syncope, respiratory failure, upward deviation of the eyes, dilatation of the pupils, rigor of the masseters, and asphyxial extensor spasm and rigidity. The string of the electro-cardiograph at this time was seen to be standing still. The subject was taken away from the electrodes, placed in a supine position upon the floor, and artificial respiration instituted. An attempt was made to massage the heart through the abdominal wall and diaphragm at the left costal margin. In the course of four or five minutes voluntary respiration was again established, the pupils contracted, and consciousness was regained. No residual effects were noted.

The examination of the electro-cardiogram during this period showed the normal cardiogram to be replaced by one in which the rate of the heart was reduced to one-half. No changes were to be seen in the P.Q.R. complex at the time of this change in the frequency. Each wave possessed its normal order, time relationship, and character. After this bradycardia had lasted for ten seconds it was replaced by a series of small waves, which were suggestive of vibration of the string. There is no evidence in the cardiogram that the ventricle was beating during this period. At the end of the curve, when the subject was removed from the electrodes, these small fibrillary waves were less frequent but of greater amplitude. There was as yet no evidence of the R wave of ventricular contraction. The tracing was that of a prolonged sino-auricular block.

Comment.

From these few observations it is not possible to reach any conclusions as to the effect of calcium upon the normal electro-cardiogram.

Whether the effects noted in the second experiment are evidences of vagal stimulation or a direct action

upon the genetic nervous system of the heart independently of any extrinsic nervous supply it is impossible to state. The nature of the results obtained rendered it inadvisable to repeat the experiment following atropinization.

The disturbances of conduction noted are somewhat in accordance with those obtained by Walters and Bowler in the dog. I simply desire to call attention to the occurrence of cardiac disturbances of conduction as a result of intravenous calcium administration in a dosage that has been commonly used.

Summary.

The intravenous use of 4 c.cm. of a 10 per cent. solution of calcium chloride is dangerous. The electro-cardiogram shows what we believe to be a sino-auricular heart-block.

The Treatment of Pernicious Anæmia with Liver and Liver Extra.

By STANLEY DAVIDSON, B.A. (Camb.), M.D.,
F.R.C.P. (Edin.),

J. G. McCRIE, M.B., Ch.B. (Edin.)

and

G. LOVELL GULLAND, C.M.G., M.D., F.R.C.P. (Edin.).
(*Lancet*, April 28, 1928, p. 847.)

Treatment with Whole Liver.

THE diet advocated by Minot might be summarised as being a well-balanced, ample diet, high in vitamins, low in fats and carbohydrates, and having as its essential daily component 200 g. of liver. No two cases require the same amount of liver for the specific effect to be produced. Amounts in excess of 200 g. may be necessary, or less may suffice. From practical experience, we are very strongly of opinion that unsatisfactory results are attributable to one fact alone, and that is the giving of insufficient quantities of liver. In several cases of the series quoted below, the patients were unable at first to take more than 4 oz. liver and 4 oz. liver juice per day. Rapid improvement was seen for the first six weeks, by which time the red count was approximately three millions. No further improvement could be produced until the amount of liver eaten was substantially increased. Some patients have a great abhorrence of liver, owing to its nauseating effect, and in these it is extremely difficult to bring the blood picture back to normal. It may be generally said that pernicious anæmia patients tolerate liver better than do normal persons, and we have invariably found that, as improvement continues, the dislike of the diet decreases. Some of the patients with counts of a million or below were so nearly moribund that the taking of solid food was an impossibility. Liver juice was tried, but this requires to be given in very large quantities before satisfactory results are obtained. In a personal communication to one of us (S. D.) Minot states that the giving of liver juice is the most unsatisfactory dietetic method, while raw pulped liver is the most efficacious.

Treatment with Liver Extracts.

Cohn and his co-workers have shown that, by a method of fractioning, a non-protein substance can be obtained, 5—15 g. of which is as efficacious as 200 g. of whole liver. As this substance is soluble in water, and exerts its action when given by the mouth, the treatment is greatly simplified for patients who are too ill to take solid substances, and is far more pleasant to those who object to the large amount of liver it is essential to eat. For these reasons, liver extracts will, in the future, largely supersede whole liver. Six different preparations have been tested, one being American, two being German, and the remaining three British. Since all these preparations were found to be active,

the manufacturing process appears to present little difficulty. Their mode of action is identical with, but even more striking than treatment with whole liver, because it is possible to give the specific factor contained in 1000 g. of liver in one dose.

Conclusion.

One of us has had a long experience of pernicious anaemia and of the remissions that can be produced by all the methods of treatment formerly in use. The impression formed of treatment by liver and liver extract is that its effects are more promptly, rapidly, and regularly produced than by any former method, although occasionally treatment by arsenic or sometimes no treatment at all may be followed by remissions as rapid in their commencement. The period of recovery is certainly shortened. The recovery is more continuous. The production of a colour-index below unity, which under previous methods of treatment has been found to occur in cases which are going to do well, regularly develops under liver therapy. The most important point, however, is that recovery is more complete. Formerly one had too often to be content with a count of about 3,500,000 R.B.C.'s; now an extra million or more may be confidently expected; the whole blood picture returns to the normal with much greater frequency and certainty, and apparently remains so indefinitely, so long as treatment is persevered with. Two cases have been seen whose treatment was begun in America; they are not included in the foregoing lists. The first had begun liver treatment in 1925 and continued it steadily. The blood was examined twice at an interval of about a year and was practically normal on both occasions. The second was seen once 18 months after treatment was begun and the blood was normal. Both were in vigorous health. This return to vigorous health is certainly more frequent and complete—and, let us hope, permanent—than has ever been experienced as a result of previous methods.

It is important to notice that liver treatment is effectual at any age, and still more that it acts just as well in chronic cases as in acute ones. Some patients had had arsenic *ad nauseam* in various forms, had ceased to respond to it, and could no longer tolerate it, but they answered just as promptly to liver as if they had been fresh cases. It appears to be immaterial to the success of the treatment whether the patient is in his first attack or has suffered several relapses. It seems to be a matter of indifference whether the patient is treated with liver or with the liver extracts which we have tested. All the latter seem to be efficacious, and it will be a matter of personal liking and convenience whether liver or the extract is chosen for treatment.

Is the treatment free from risk? In the great majority of cases it certainly is. Nothing more serious than an occasional temporary diarrhoea is likely to occur, and this can be dealt with by stopping fruit and vegetables for a few days. But it is to be noted that renal complications may arise, though their connection with liver treatment is not definitely proved. One of our hospital cases had an acute nephritis and one died of uraemic vomiting and convulsions. One of us long ago pointed out that the only condition which will cause a persistent leucocytosis in pernicious anaemia is kidney mischief. In that case the leucocytosis should have been a warning, but the patient was in such magnificent health until the final collapse that the warning was disregarded. No pernicious anaemia comes to the post-mortem table with normal kidneys, but this is hardly ever evidenced by albuminuria. In cases with a persistent leucocytosis, it would probably be wiser to trust to liver extract alone, which contains no protein, and not give the large quantities of red meat advocated in Minot's original diet.

In the first few private cases one was inclined to give arsenic as well as liver, on the principle that it is unwise to throw away a crutch too soon, but that was soon found to be unnecessary. Hydrochloric acid

is of value in improving appetite and hence may be used in combination with liver therapy. It is certainly not responsible for the remarkable improvement following the exhibition of liver, as equally good results are obtained in cases which have never received any acid.

Minot has formed the opinion that the nervous symptoms are not benefited by liver treatment, except in so far that as the muscles become stronger the patient can walk better. We are inclined to differentiate a little more. It seems to us that in cases in which the symptoms are of the tabetic type very marked improvement may occur, but in cases of the spastic type we have, so far, either seen no improvement or, as in a case in the private series, a distinct increase of spasticity may supervene, possibly because the muscular tone is increased.

Reviews.

MEDICAL ANNUAL, 1928.—Bristol: John, Wright & Sons, Ltd. Pp. 630, with 130 illustrations. Price, 20s. net.

To the general practitioner in this country the *Medical Annual* is a godsend. It enables him by the expenditure of a comparatively small sum to keep up to date in all branches of his profession. To the specialist also it is an extremely valuable publication.

The *Medical Annual* for 1928 has fully maintained the reputation of this publication; there are no material differences between it and its immediate predecessors, but the yearly improvement has been maintained. The book has now reached its limit in size and if next year the publishers contemplate increasing the thickness of the book they will have to consider seriously the question of dividing it into two volumes.

It is impossible to discuss the individual contributions; the contributors are in each instance experts on the subject with which they deal. Most of the tropical diseases have been reviewed by Sir Leonard Rogers and the recent advances described clearly and concisely. The most striking recent advance in the treatment of non-tropical diseases is the liver treatment of pernicious anaemia. The results which are claimed from this treatment are most remarkable, more especially in view of the fact that it is a disease the aetiology of which is not very clear. A number of pages are devoted to this subject. Recipes for making raw liver less noxious and cooked liver appetizing are given; this is a practical point of great value as practitioners have often found that patients would prefer to die than to eat raw liver in the condition in which it has sometimes been presented to them.

There are numerous most excellent plates—the ones that particularly appeal to the reviewer are those showing the skin reactions in the Schick test and the Dick test, respectively—and some most interesting skiagrams.

L. E. N.

PUBLIC HEALTH LABORATORY PRACTICE.—By Lieut.-Col. A. D. Stewart, I.M.S., Professor of Hygiene, Calcutta School of Tropical Medicine, and Lieut.-Col. T. C. Boyd, I.M.S., Chemical Examiner to the Government of Bengal. Calcutta: Oxford University Press, 1928. Pp. 306, with 3 figures. Price, Rs. 9.

THIS book has been written by two senior members of the Indian Medical Service who have long been connected with laboratory work on foods, drugs, and water in their official capacities, and as such they have acquired very considerable experience. The book is therefore an embodiment of knowledge, long experience, and skill.

A valuable feature of the book is its special application to Indian conditions. There are several books written on the subject in general, but none of them deals with analysis of Indian foods and Indian water supplies. Hence the book is assured of a very warm reception at the hands of public health laboratory workers in India, especially of the students who are preparing themselves for the examination for the Diploma in Public Health of Indian universities. The book is the more welcome, because it contains completely up-to-date information on the subject; for instance the chapter on "hydrogen-ion concentration" which subject has been completely omitted in such a standard textbook as "Kerrwood" is here fully described, and ten pages devoted to it.

The arrangement of the chapters dealing with the different subjects is here logical and methodical, and helpful from the student's point of view. This is often not the case with textbooks dealing with the subject. Generally it is very difficult for the medical student to follow the natural sequence in organic and inorganic chemistry in relation to public health, as he is very likely to have forgotten his elementary chemistry by the time he passes his final M.B. examination. So when he comes to read chemistry for his D.P.H. examination, he is quite at sea, when asked to commence straightaway with water and food analysis. The standard books on the subject for his instruction rarely give the student the necessary preliminary ideas on methods of general analysis, acidimetry and alkalimetry, thiosulphate titration, etc. This being the case, the student experiences difficulty when he is suddenly called upon to carry out food and water analysis. The book under review removes this difficulty by devoting one full chapter to this general analysis at the very beginning, and this will be most helpful to students.

In the fitness of things, analysis of alum, lime, and bleaching powder should be included in the chapter on water and sewage analysis, but this is, curiously enough, not to be found in any other textbook. The authors have not omitted to describe these analyses. The chapter on "aims, objects, and interpretations of the sanitary chemical analysis of drinking water" is very well written, and most instructive. Indigenous Indian samples have been well chosen here, a fact which will be much appreciated by all workers in India interested in the subject of water analysis. Some of the explanations are quite original, e.g., the free ammonia content in such a surface water as that of the river Hughli remaining low in spite of considerable pollution, owing to the heat of the tropical sun acting deleteriously on the "nitrifying organisms."

The subject of milk has been very comprehensively dealt with. It is pleasing to find here analyses of such indigenous articles as *churna*, with suggestions for the standards to be fixed. These suggestions should prove useful guides to local authorities, if they choose to include such foodstuffs in future amendments of the Food Adulteration Act.

In the chapter on "oils and fats" their general chemistry and classification have been fully dealt with, and this section will be very useful to students in trying to grasp the principles underlying their analysis. The physics of the butyro-refractometer are fully explained with the aid of diagrams. Modern milling processes for preparing flour are well described—another matter which is not dealt with in other textbooks on the subject. D.P.H. students will much appreciate the schedules given of the latest regulations on preservatives in food. A good description is also given of the kata-thermometer. In brief, within the narrow compass of 306 pages the authors have included all possible information on the more important matters dealt with in public health chemistry.

Unfortunately, the table of atomic weights has been included in the section dealing with rag floc; this is clearly a printer's error. With the exception of a few minor printer's errors, however, which we hope, will be corrected in a second edition, the manner in which the book has been printed and got up leaves nothing to be desired.

This book can be heartily recommended to all public health workers in India, and, above all, to all students preparing for a Diploma in Public Health.

R. B. K.

THE USE OF SYMPTOMS IN THE DIAGNOSIS OF DISEASE.—By H. A. Hare, B.Sc., M.D., LL.D. Ninth Edition. London: Henry Kimpton, 1928. Pp. 528, with 124 illustrations and 4 plates. Price, 30s. net.

We have just received a copy of the 9th edition of this excellent book. The author has realised that at present the purely clinical side of medicine is being under-valued, and that more importance is being attached to laboratory examinations and laboratory methods. A well trained physician should carefully note the clinical signs and symptoms first and the laboratory investigation should be called in as a further aid when necessary. This book has been written to bring home to the physician the importance of physical signs and symptoms.

The plan of the book is very simple and effective. Different parts of the body are taken up one by one and are carefully studied with regard to any deviation from the normal, beginning from their general and superficial aspects and working down to deeper structures. Special chapters are devoted to important symptoms such as headache, vertigo, coma, convulsions, hiccough, vomiting, cough, and different kinds of pain, etc. The new edition will be welcomed by medical students and practitioners alike.

R. N. C.

THE SIMPLE GOITRES.—By Robert McCarrison, C.I.E., M.D., D.Sc., LL.D., F.R.C.P. London: Baillière, Tindall and Cox, 1928. Pp. x plus 106, with 43 figures. Price, 10s. 6d. net.

COLONEL McCARRISON is a well known authority on goitres, and his experimental work on this subject has been appreciated by the whole medical world. This volume was the outcome of a "Report to the International Conference on Goitres" held under the auspices of the Swiss Goitre Commission at Berne last year. The book is divided into two parts:—

Part I deals with the aetiology and epidemiology of simple goitre. Three main types are described. The factors concerned in their production include food deficiencies, food excesses, polluted water supplies, gastro-intestinal infections, and insanitary conditions of life. A large number of them can be prevented by attention to the fundamental principles of nutrition and personal and social hygiene. Various types of these goitres may prevail in the same locality, some being capable of amelioration by the prophylactic use of iodine while others are not and some may even be harmed by it. The author warns against the indiscriminate use of iodine as a preventive of goitre.

Part II is composed of illustrations, and contains many curves, reproductions of pictures of human cases and of animals in which goitre was experimentally produced, and numerous microphotographs of sections of the gland.

The book is very well got up and will be of great interest to the profession.

R. N. C.

COMMERCIAL DRUGS OF INDIA.—By L. R. Dutt, M.R.A.S. (Lond.). Calcutta: Thacker, Spink and Co., 1928. Pp. 256. Price, Rs. 5.

THE writer in his introduction says that this book is not intended so much for medical practitioners as for business men. Its object is to place before the drug grower, collector or dealer, as briefly and lucidly as possible, all the available information regarding the sources, method of collection and cultivation and marketing of drugs. Most of the common drugs found on the market are mentioned, but such drugs as *Ephedra vulgaris* which have lately assumed considerable importance from the commercial point of view and which grow in India abundantly have not been included.

Otherwise the book is quite up-to-date and most of the recent work on the indigenous Indian drugs has been included in it. The book ought to prove very useful to business men and also to medical men who are interested in Indian indigenous drugs.

R. N. C.

BEDSIDE MEDICINE. (A HANDBOOK OF DIAGNOSTIC METHODS.)—By A. R. Majumdar, M.B., Bengal Medical Service. Calcutta: The Book Co., 4-4A, College Square, 1928. Pp. 443, with 149 illustrations. Price, Rs. 6-8.

This is an admirable little book on which we congratulate both the author and the publishers. It is exactly what the Indian medical student wants; concise, well illustrated, original, and written with special reference to tropical diseases. The author was for some nine years tutor of medicine in the Medical College, Calcutta, and is now teacher of materia medica and physician at the Campbell Hospital, Calcutta. Hence he has had long experience of teaching Indian medical students, knows what they want in the way of instruction, and how to give it to them. In a foreword to the book Colonel Sandes, I.M.S., Professor of Medicine at the Medical College, Calcutta, writes "Twelve years teaching experience in the medical colleges of Bengal has fully demonstrated to me the necessity for such a book. It should prove of immense value, if properly used and applied. Every author, in some degree, portrays himself in his work, and the large mass of clinical facts, methods and measures that Dr. Majumdar has collected, co-related and put together in his book typifies his own undoubted teaching ability and tireless energy."

A specially useful feature of the book is its numerous original illustrations, photographs of cases of special interest, pulse tracings, electrocardiograms, diagrams, and the like. Unlike many authors, Dr. Majumdar has throughout relied on his own personal experience, and his own collected case notes. Where he borrows from other authors, he makes every acknowledgment.

The book is well printed and well bound, and of a convenient size. It deals with every aspect of bedside and clinical medicine, and we can thoroughly recommend it to medical students and practitioners in India and Eastern countries.

Annual Report.

REPORT ON THE KALA-AZAR SURVEY IN PATNA CITY. AUGUST—NOVEMBER 1923. BY LIEUT.-COL. WILLIAM C. ROSS, I.M.S., DIRECTOR OF PUBLIC HEALTH, BIHAR AND ORISSA. PATNA: SUPERINTENDENT, GOVERNMENT PRINTING, BIHAR AND ORISSA. 1928.

(1) *Introductory.*—In 1923 I received reports that kala-azar was very prevalent in Patna City, and that large numbers of cases were coming forward for treatment since the efficacy of injections of potassium antimony tartrate and subsequently sodium antimony tartrate had been established, and facilities for treatment had been provided in the hospitals. In August 1923, I had available a number of epidemic doctors whose services were not immediately required for epidemic duty, and I thought it desirable that definite information should be obtained as to the prevalence of the disease and as to the conditions associated with it. At that time there was no information available as to the epidemiology of the disease, and the conditions favouring its prevalence, and the work

of investigation had been chiefly confined to the search for a biting insect which would fulfil the double function of transmitter and host, on the analogy of the rôle played by the mosquito in malaria.

As it appeared that Patna was probably an endemic area of kala-azar infection, and as I had an available staff of eight doctors temporarily available at the time, I arranged for a detailed survey of an area of some considerable size in Patna City. The area was selected with a view to including both a congested bazar area, and a more open area with conditions similar to those in any village in Bihar. From the points of view of convenience, size, accessibility and representativeness, I selected an area comprising approximately two wards of Patna City, one of which was congested, and in one of which the houses were scattered. A schedule was prepared for recording and compiling the observations, and whilst the schedule was in press the hospital records of the Patna General Hospital and of the Patna City Hospital were examined, and a compilation was made of the statistics of kala-azar cases coming in for treatment. These statistics were subsequently completed up to the end of 1923.

The work was carried out very carefully and thoroughly by eight of the epidemic doctors of the provincial staff, who personally visited and inspected every house in the area, who examined all the inhabitants personally, and who filled in the schedules for each holding and subsequently abstracted the statistical results of the investigation. The work lasted for more than eight months.

(2) *Hospital Statistics.*—During the four years, from 1920 to 1923, 3,076 cases of kala-azar were treated in the Patna Hospital as shown in the abstract statements below:—

Statement I.

	Males.	Females.	Total.
1	2	3	4
1920 ..	550	183	733
1921	515	234	749
1922	420	186	606
1923	778	210	988
TOTAL ..	2,263	813	3,076

Statement II.

	Hindus.	Muham- madans.	Total.
1	2	3	4
1920	423	310	733
1921	410	339	749
1922	350	256	606
1923	692	296	988
TOTAL ..	1,875	1,201	3,076

Statement III.

	Under 10	10-20	20-30	30-40	Over 40	Total.
1	2	3	4	5	6	7
1920 ..	289	240	114	60	30	733
1921 ..	303	248	109	60	29	749
1922 ..	241	202	93	50	20	606
1923 ..	330	323	188	108	39	988
TOTAL	1,163	1,013	504	278	118	3,076
Percentage of total cases in each age group.	37.8 %	32.9 %	16.4 %	9.0 %	3.9 %	
Percentage distribution of population in each age group.	24.8 %	17.8 %	16.4 %	15.2 %	25.5 %	

The population of Patna at the last census was 119,976, comprising 90,248 Hindus and 28,200 Muhammadans. In other words there were more than three Hindus to each Muhammadan. The age distribution of the general population is shown in Statement III above.

The total of 3,076 cases treated in four years gives an average annual figure of 769, in a population of 118,448 Hindus and Muhammadans, which represents a general incidence of 6.5 cases per thousand of population. It is necessary, however, to discount this estimate to some considerable extent on account of the attendance of cases from surrounding villages outside Patna Municipality and it is probable that the incidence of 4.5 per thousand arrived at in our detailed survey, in a typical representative area, is more nearly accurate. Again, however, allowance must be made for the fact that the most congested and the most unhealthy parts of Patna City were not included in the survey, as it was desired to get some measure of the prevalence of the disease under ordinary conditions and not in a specially selected unhealthy or congested area.

I am of opinion therefore that the probable incidence of kala-azar amongst the general population in Patna City and in a large part of Bihar is between four and five per thousand.

(3) *Scheme of Survey.*—The area selected for survey was first selected because of its being a typical representative area of suitable size which included both congested and open areas, and which contained all types of houses, and all sorts and conditions of people.

(4) *Summary of Results.*—The population of the 7,897 holdings investigated in the survey was 36,062 of which 25,311 were Hindus, 10,561 were Muhammadans and 190 were Christians. The returns showed 162 cases of kala-azar of which 17 had recently died, 24 had just completed treatment and 121 were being treated, except in a few instances in which we advised them to go to the hospital for treatment. The general incidence of kala-azar in the area was therefore 4.5 per thousand during the year of the survey.

With regard to sleeping habits it was found that almost every one slept on a bed, and that practically no one used a mosquito net.

The information with regard to domestic water-supply indicated that differences in the water-supply were not associated with any material difference in the prevalence of kala-azar. The area surveyed was specially selected so as to include a long line of habitations on or near the bank of the Ganges and it was found that the majority of the population near the river used river water entirely, and that a large number of those

situated further away took river water for drinking and cooking, but there was no appreciable difference in the incidence of kala-azar either amongst those who used river water in part or altogether, or those who did not use it at all.

(5) *Site Incidence.*—A spot map of the distribution of kala-azar cases and probable cases in this area is given (but not reproduced here, Ed.). It is perhaps at this point necessary to explain that the distinction between kala-azar cases and probable cases, has reference to the fact that all cases are shown as probable cases in which the presence of the parasites was not demonstrated by spleen puncture. As a matter of fact, the probable cases were mostly being treated for kala-azar, and all the cases shown as probable cases presented the definite clinical picture of kala-azar. This explanation appears to be necessary as some of the workers investigating kala-azar are not so meticulous in regard to their statements as to what is proved, and what is suspected or probable, and the heading 'Cases of enlarged spleen probably kala-azar' might be misunderstood.

The general numerical distribution of the cases is roughly in proportion to the density of population. The most densely populated areas are those which show the largest number of cases.

Of the total number of the 162 cases, 138 occurred as single cases in separate houses, whilst only 24 multiple cases occurred in 11 houses. So far as it goes, this would appear to indicate that kala-azar is not a disease in which one case supplies the infection for producing other cases, and the general distribution of the cases throughout the area also supports this view.

(6) *Religious Incidence.*—In the survey population of 36,062, there were 25,311 Hindus and 10,561 Muhammadans. Amongst the Hindus there were 95 cases, whilst amongst the Muhammadans there were 66 cases. The case incidence, therefore, was equal to 6.2 per thousand amongst the Muhammadans against 3.7 per thousand amongst the Hindus. In the record of 3,076 cases tabulated in Statement II in paragraph 2 of this report, the incidence of kala-azar appears to be even greater. Taking the average of the four years' figures, the prevalence of the disease works out at 6.5 per thousand on the population of Patna, and the incidence amongst Muhammadans and Hindus works out at 10.6 and 5.2 per thousand, respectively. It is, however, necessary to discount these figures to some extent, as pointed out in paragraph 2 above, owing to the inclusion in the hospital returns of cases coming from outside municipal limits. That consideration, however, does not seriously affect the relative incidence between Muhammadans and Hindus, which, in this case, is 10.6 against 5.2 as compared with 6.2 against 3.7 in the survey returns. This preponderance of kala-azar infection amongst Muhammadans has been noted by other observers and appears to occur all over India. It must, therefore, be associated with some distinctive difference in customs and habits between the two religions, as it is not in any way a local phenomenon. I have gone carefully into the differences which are characteristic between the two religions. The housing and water-supply of both the religions are similar. The conditions regarding exposure to insect bites are identical, and the only fundamental difference from the health point of view is in the eating habits of the two religions. The Hindu—especially the high caste Hindu—always eats freshly prepared food and throws away what remains after every meal. A Muhammadan frequently eats food which has been prepared beforehand, and often eats food prepared several days previously. This is the most characteristic and in my opinion the most important difference between the habits of Hindus and Muhammadans, and I consider that it indicates that the probable source of infection is in the food, and that the invasion of the disease takes place through the intestinal tract.

The excess incidence amongst Muhammadans would not be so surprising if Muhammadans were in general more subject to disease than Hindus, but such does not

appear to be the case. I have compiled a table of the mortality rates of Hindus and Muhammadans for the whole province of Bihar and Orissa for ten years, which shows that the average annual death-rate amongst Hindus was 33.2 per thousand against 27.9 per thousand amongst Muhammadans. These figures have been taken from a population of over thirty millions for a period of ten years, and may therefore be accepted as a definite indication of the condition of health prevailing in these two religious communities. A consideration of these figures tends to increase the importance of the difference in the religious incidence of kala-azar.

(7) *Age and Sex Incidence.*—Statement I in the second paragraph of this report shows the sex incidence in 3,076 cases. The preponderance of males as represented by 2,263 cases against 813 female cases is probably more apparent than real. Owing to the reluctance of many Indians to bring their female relatives to hospital, it is not possible to accept these figures as a correct representation of a real difference in sex incidence. There may be such a difference. If so, it will be difficult to explain or to understand, and until such a difference in sex incidence has been established, I am not prepared to give any importance to these figures. If any real difference in sex incidence exists, it is probably associated with the greater freedom of habits permitted to boys as compared with girls.

The point of view that sex incidence is more apparent than real, is supported by the fact that amongst the 161 cases recorded in the survey amongst Hindus and Muhammadans, amongst the Hindus, in 96 cases, 74 were males and only 22 females; whereas amongst the Muhammadans, in 65 cases, 39 were males and 26 were females. The ratio of males to females amongst Hindus is roughly 7 to 2 whereas amongst Muhammadans it is only 3 to 2.

It is well known in India that there is some reluctance on the part of Muhammadans to bring their female relatives to hospital, and that the disinclination of Hindus to do so is much greater, especially amongst the higher castes. If the figures above quoted are interpreted in accordance with these known prejudices, it appears probable that the disease affects both sexes more or less equally.

In Statement III, in paragraph 2 above, the age incidence of 3,076 cases is tabulated and the percentage in each age group is shown,—and also the percentage distribution of population in each age group.

The age incidence of the 162 cases recorded in the survey was as follows:—

Statement IV.

	Under 10	10-20	20-30	30-40	Over 40	Total.
1	2	3	4	5	6	7
Number of cases.	64	54	30	8	6	162
Percentage of total cases in each age group.	39.5	33.3	18.5	4.9	3.7	
Percentage distribution of population in each age group.	24.8	17.8	16.4	15.2	25.5	

It is interesting to note the similarity that exists between the two tabulated Statements III and IV. Many other observers have recorded similar observations with

regard to the age incidence in kala-azar, and all of them have made a point of the extraordinary prevalence of the disease amongst children and adolescents. I have not however been able to find on record any correction for age distribution such as I have included in the two statements above.

When the age distribution of the disease is considered together with the figures for the general age distribution of the population, it at once appears that kala-azar is not so predominantly a disease of children as has previously been thought. The correction brings the relative age distribution into better perspective, and shows that whilst kala-azar is most common in children, it is at the same time very frequent in adults and cannot be considered to be characteristically a disease of youth.

Another very important point in the age distribution is that kala-azar is a very rare disease below the age of two years. In the 3,076 cases tabulated in Statement III there was no case below two, and amongst the 162 cases recorded in the survey there was only one case which was just under two. In my opinion this is a point of great importance, which further supports the theory that the invasion of kala-azar is through the intestinal tract. In Bihar and in general in India, children under two years of age are nearly all breast-fed, and would therefore not be liable to infection. On the other hand, infants in India are at least as liable as adults to being bitten by mosquitoes, sandflies, bugs, etc., if not more so, as they spend more of their time in sleeping, and are incapable of ridding themselves of these biting insects in the way that an adult can do.

Malaria, which is known to be transmitted by mosquitoes, and which is a prevalent disease in India, affects the youngest infants and is a frequent cause of disease and death in infants under three months of age. Kala-azar on the other hand has a peculiar age distribution in which infants are very rarely affected, and it is very difficult, if not impossible to reconcile this fact with any theory of transmission by a biting insect.

(8) *Housing Incidence.*—The distribution of the 162 cases amongst the 7,897 holdings was somewhat of a surprise. It was formerly held that kala-azar was a disease which was associated with defective sanitation and bad housing. Defective sanitation is a term which is very vague and very wide, and is a condition which is most probably directly associated with the explanation, but certainly bad housing has nothing whatever to do with the disease. Defective sanitation is a universal feature in Patna City. Decomposing filth and accumulations of rubbish and garbage are found all over the town in the courtyards and in the immediate vicinity of all premises, from mud huts to the best built masonry houses. Cows and goats are kept in large numbers within their owners' premises and are kept both by Muhammadans and by Hindus equally and quite irrespective of religion. They are kept chiefly as a source of milk supply and their presence adds very appreciably to the insanitary state of the premises where they are kept.

There were 800 masonry brick-built houses in the area surveyed, and in these 31 cases occurred, giving a house incidence of 38.7 per thousand, whereas there were only 131 cases in 7,097 mud houses and huts which show a ratio of only 18.4 per thousand.

Of the 800 masonry houses, 392 had masonry privies and 408 had only rough arrangements for use as privies, chiefly consisting of two bricks for the feet to rest on, with an earthenware receptacle between. In the 392 houses with masonry privies there were 19 cases of kala-azar, whilst in the 408 houses without masonry privies there were only 12 cases. The incidence in this respect is 48.4 per thousand against 29.4 per thousand.

If all the holdings are divided into three classes, viz., those with masonry privies, those with rough and ready arrangements consisting only of a stance with a removable earthenware receptacle, and those with no privies at all, the distribution of cases is even more remarkable as shown in the attached tabulated statements.

Statement V.

	Number of such houses.	Number of cases in them.	Ratio of incidence per 1,000 houses.
Masonry houses ..	800	31	38.7
Mud houses and huts	7,397	131	18.4
TOTAL ..	7,897	162	..

Statement VI.

	Number or such houses.	Number of cases in them.	Ratio of incidence per 1,000 houses.
Houses with masonry privies ..	392	19	48.4
Houses with open privies consisting of two bricks and a receptacle ..	5,471	112	20.4
Houses with no privies	2,034	31	15.2
TOTAL ..	7,897	162	..

From a consideration of these statements, the remarkable fact emerges that masonry houses with masonry privies, built in accordance with the prevailing ideas of progress in construction and in sanitation, are of all houses the most unhealthy from a kala-azar point of view, and that the simple hut of the poor man, which has no privy at all, is least of all invaded by the infection of kala-azar.

The question of poverty and of the nature of the diet has obviously therefore very little to do with the prevalence of the disease, as the poor man in his mud hut is much better off than his rich neighbour in a large masonry house. The explanation of this anomaly is difficult to comprehend, but it must be in accordance with some definite general principle, and must tally with all the facts in the life-history, distribution and habits of the transmitting agent.

(9) *General Conclusions.*—The abstracted results of a detailed survey such as this are of great interest, and form a valuable basis for the further consideration and investigation of the transmission of the disease. The observations of greatest importance appear to be those on the site incidence, the age and sex incidence, the religious incidence and the housing incidence, and in my opinion all of these observations point to the fact that kala-azar is not transmitted by biting insects, but that infection takes place through the intestinal tract.

In this report I have not entered into a detailed discussion of the observations made, but have indicated what appears to me to be the direction in which the explanation may be found."

[At the Congress of the Far Eastern Association of Tropical Medicine recently held in Calcutta, Col. W. C. Ross criticised the various investigators on the kala-azar transmission problem on the ground that they had not done any epidemiological investigation. This was an unfair charge and was refuted by one of the subsequent speakers, but it would perhaps have been fair had he said that insufficient work on these lines had been done. We cannot know too much about the epidemiology of the disease, and any scientifically collected and collated epidemiological observations will be pounced upon

hungrily by the research worker in this field. Col. Ross's report is, therefore, extremely welcome.

We have, however, one very grave charge to bring against Col. Ross; this investigation was carried out between August and November 1923, and yet it did not find its way into print before 1928, and, apparently, was guarded as a strict secret until December 1927, when at the Congress referred to above we were given some hint of its results.

Col. Ross concluded "in my opinion all these observations point to the fact that kala-azar is not transmitted by biting insects, but that the infection takes place through the intestinal tract." Yet, though he must have been aware that the Kala-azar Commission were devoting almost the whole of their activities to the sandfly and other biting insects, he did not divulge his secret, but allowed large sums of money to be spent in a futile quest. How amused he must have been to think that first class investigators like Col. Christophers and Major Shortt were wasting their valuable time, and the money of the Government, in attempting to persuade the sandfly to transmit the disease, when all the time he was sitting on a report which, in his opinion, would have shown them the error of their ways!

There are a certain number of points in the report which call for comment. In suggesting that the three thousand patients treated for kala-azar in the two Patna hospitals probably include a number of persons who live outside the city and have come in for treatment he is probably correct, but he does not seem to have taken into consideration the fact that a number of persons will have been treated privately, that a still larger number may never have applied for treatment at all, and that a third but probably smaller group will have gone elsewhere for treatment. It seems far more probable that his estimate of 6.5 per thousand is an under-estimate, rather than an over-estimate, as he suggests it may be. The fact that the figure based on the detailed survey is only 4.5 per thousand does not tend to make the reviewer change his opinion; such surveys, unless carried out over long periods and in conjunction with treatment centres (or hospitals), always produce too low a figure.

Col. Ross states later on in his report that "it appears probable that this disease affects both sexes equally." If this is the case, it means that 1,450 women (2,263 less 813, *see* Statement I) suffering from kala-azar did not apply for treatment; the addition of this number would increase the total by nearly 50 per cent., bringing it up to almost 10 per thousand for Patna town. In the same way 65 women would have to be added to the cases in the local survey, which would bring this figure up to 6.3 per thousand.

Site Incidence.—The rarity of multiple infections in households in Patna is very interesting. In Calcutta, the disease is very definitely a house infection. Our experience has been that the disease seldom appears simultaneously in two members of the same family but that a succession of cases, at intervals of 6 months to a year, come from the same house. Perhaps, it was on account of the fact that this survey only covered a very short period that multiple infections were so rare.

Religious Incidence.—There can be little doubt that in Patna town there is a slight preponderance of the disease amongst the Muhammadan community, but in calculating this, Col. Ross again made no allowance for the sex question. If the male patients of the two communities alone are taken into consideration, it will be seen that the incidence amongst Muhammadans and Hindus is 3.7 and 2.9 per thousand, total population, respectively, no very striking difference when one realises that the calculations are based on only 113 cases.

The preponderance of kala-azar infection amongst Muhammadans has, as Col. Ross says, been noted by other observers but it is not a constant factor. His explanation of the cause of this preponderance may of course be correct, but there are many other possible explanations. A biting insect would admittedly not distinguish between a Muhammadan and a Hindu, but if

the surroundings in which one or other lived were more congenial to the insect, then that one would be exposed much more frequently to the bites of this insect than would the other.

Age and Sex Incidence.—Col. Ross has scored a point in correcting the age distribution by giving the general age distribution of the population. He says, "It at once appears that kala-azar is not so predominantly a disease of children as has previously been thought." But surely Col. Ross is tilting at a windmill with a very indifferent lance! Is it fair to correct the percentages of kala-azar cases attending hospital by the general population figures? Should not the hospital attending population also be taken into consideration? As far as the detailed survey is concerned, it is probably fair to correct by means of the general population. Col. Ross has given us the figures for comparison, but has not done the calculation for us. The table below gives the incidence per mille amongst the various age groups and the percentage distribution of the disease amongst the various age groups had there been the same number of individuals in each group.

Age group.	Under 10	10—20	20—30	30—40	Over 40
Number of cases.	64	54	30	8	6
Per mille incidence in each group.	7.17	8.41	5.07	1.46	0.65
Percentage of total cases in each age group corrected according to distribution of general population.	31.6	37.0	21.8	6.1	2.9
Assam dispensary figures, uncorrected, %	30.76	37.8	18.0	9.7	3.8

As the reviewer has on more than one occasion recorded observations with regard to age incidence, it must be supposed that he is included in Col. Ross's remark that "all of them have made a point of the extraordinary prevalence of the disease amongst children and adolescents." In the reviewer's book on kala-azar published in 1927, he gives four sets of figures for age distribution for India. These are admittedly "uncorrected." If these figures show the "extraordinary prevalence of the disease amongst children and adolescents," then Col. Ross's figures tend rather to emphasise than correct the observation. For comparison the Assam dispensary figures, based on over fifteen thousand cases, quoted in the reviewer's book, are given.

In the reviewer's experience, the disease is not so rare in young infants as Col. Ross suggests. Infants in arms are not very often brought to dispensaries or hospitals, but amongst the few that have been brought, we have found that the percentage of those suffering from kala-azar is much the same as in other age groups.

With regard to the sex distribution, Col. Ross holds the views of most other observers. Almost all the figures that can be quoted show a much greater percentage amongst males, but the closer one gets to the village, the greater the percentage of women amongst patients, and it is generally agreed that, if at all, the disease is only slightly more prevalent amongst males.

The observation with regard to housing is very interesting and supplements the reviewer's observations in Calcutta; he found that multiple infection was much more common in dilapidated masonry houses than in huts.

The observations with regard to the sanitary arrangements of the dwellings are of considerable interest. At the Congress, Col. Ross suggested that the presence of the privy might be the cause of the spread of the infection in the house. In houses where there is a satisfactory privy the incidence is 4.84 per hundred houses, whereas it is only 1.52 in houses without any privies. This seems to confirm the above suggestion. But the largest group of all consists of houses in which there is a very primitive and unsatisfactory privy and in these houses the incidence is 2.04 per hundred houses, or considerably less than half the incidence in the houses with satisfactory privies. If infection were spread from a good privy, how much more readily would it be spread from a bad one. The houses in which there were privies were all masonry houses, and in this group—masonry houses—the distinction between the houses with and without privies was not so marked; furthermore, the figures—19 and 12—are very small. It seems, therefore, very likely that the privy has nothing whatsoever to do with it and that, if anything, it is the nature of the house that is the important point.

Col. Ross has shown us that the epidemiology of the disease in Patna is much the same as in other parts of India, more especially Bengal, and for that we must thank him, but in his brave jump from the recorded facts to sweeping conclusions we are not prepared to join him; we do not think that "all these observations point to the fact that kala-azar is not transmitted by biting insects, but that infection takes place through the intestinal tract."—L. E. N.]

Correspondence.

NOVEL METHODS OF TREATMENT.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I beg the hospitality of your columns for the following comment:

Several of your contributors, when discussing novel remedies or unusual methods of treatment, star the brightest side of the picture to the profession. The cases of pneumonia which have been treated by rectal administration of potassium permanganate, or of rheumatism which have appeared to have improved on intravenous injection of sodium salicylate, are examples. The latter appeared to have been cured in every instance. This can hardly be said to be a correct presentation of the case, when we remember that even a specific such as quinine in malaria does not give completely satisfactory results in every patient.

A model contribution was that by Lieut.-Col. C. A. Sprawson, C.I.E., I.M.S., in your issue for December 1926 on the results of the sanocrysin treatment in pulmonary tuberculosis. He mentioned a large percentage of cases in which the result was unsatisfactory, or almost a failure.

I would be obliged if you would emphasise the suggestion that every medical man, when giving his experience with new and untried remedies, should not confine himself to cases where the cure has been magical, but should also give details of those instances in which there has been a complete want of success. Only by doing so will he enable others to make a correct estimate of the value of the treatment described.—Yours, etc.,

I. A. SUFIE, L.M. & S. (Bombay).

BRUCE ROAD, QUETTA.
25th May, 1928.

(Note.—We most cordially agree, but would point out that an editor can only edit such material as comes to hand. The medical profession includes the usual percentage of optimists to be found in any profession, and the tendency to follow the latest fashion was not confined to the ancient Athenians. Perhaps the article on the treatment of intestinal amœbiasis included in this issue may help to supply a corrective.—EDITOR, I.M.G.)

AN INDIGENOUS TREATMENT FOR SNAKE-BITE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case of cobra bite presents certain features of interest:—

B. R., male, aged 36, accidentally stepped on a bino-cellate cobra, some three inches in girth, which bit him on the back of the leg about 4 inches above the heel at 9 p.m. one evening. I saw the patient twenty minutes later, and discovered two puncture marks from the fangs, some three-quarters of an inch apart in that situation. When first seen, the patient showed no symptoms except numbness of the part bitten.

Having no antivenene available, I applied an indigenous treatment which is much in vogue in the Ratnagiri district. The fang marks were well incised and chickens, one after the other, with their anuses well stretched were applied to the site of the bite. The first few chickens dropped down dead within a few minutes. From the 42nd chicken onwards, the patient stated that he could distinctly feel the aspirating action of the chickens. In all 74 chickens died, 12 more were half-dead but recovered in about six hours, and the last 6 lost consciousness but recovered speedily; in all 96 chickens were used. The whole treatment took three hours and a quarter. Most of the chickens died within three minutes. The strongest suckers were hens in their prime. Hens which had laid eggs were quite useless, and young cocks unsatisfactory. Three or four incisions were made at the site of the bite, and from time to time refreshed with the knife.

Cases of cobra bite are generally treated in this way in the Ratnagiri district, and the patients are usually cured if the treatment is begun early enough. This case shows that cobra venom can be sucked out. Those who are in a position to do so, should try whether wet-cupping cannot cure such cases.—Yours, etc.,

K. V. KUBAB,
Medical Officer.

CHINCHANI DISPENSARY,
THANA DISTRICT.

(Note.—Ratnagiri district is famous for its Echis vipers, though we suppose that cobras are equally prevalent there. The "treatment" mentioned is a very ancient one; it is commented on by Fayrer and other authorities of the last century.

What does not appear to be certain is that the patient had received a lethal dose of venom. Fresh cobra venom has about the consistency of treacle, and it is difficult to see how so viscid a substance can be extracted when it is probably buried in the tissues at two spots, about a third of an inch or so away from the sites of the punctures on the skin. It is known that cobra venom can be absorbed through the conjunctiva—or at least it is supposed so—and workers with the desiccated venom should always wear protective goggles when grinding it into solution. But when administered by the mouth, venom is innocuous. It is a little difficult to state what these chickens died from. Even in a rat bitten by a cobra full of venom, death within three minutes is the exception, and not the rule. The minimal absorption period of a lethal dose of venom for the rat is 2½ minutes, and the fowl is a much larger animal. Any suggestion with regard to the treatment of cobra bite, however, is of interest.—EDITOR, I.M.G.)

MEDICAL ETIQUETTE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—It is a matter for regret that medical men in Calcutta should show such scant respect for medical ethics. Why this should be so, one cannot explain; it is not due to ignorance, since medical men who hold responsible positions and are highly respected are the greatest sinners. I would be much obliged if you or some of your readers would give their opinion with regard to the following circumstances: (i) A patient is suddenly taken seriously ill, and his relatives in desperation telephone first for Dr. A and then for Dr. B.

Dr. A arrives first, examines the patient, and prescribes for him. After his departure Dr. B arrives. Can Dr. B take over, examine, and prescribe for the patient without the consent of Dr. A? (ii) Dr. A who is treating a patient, calls Dr. B in consultation. Is it right for Dr. B to take over charge of the patient and treat him independently without the knowledge or consent of Dr. A, and can Dr. B attend other patients in the same family without the knowledge of Dr. A? (iii) Whilst a patient is in charge of Dr. A the relatives ask Dr. B to see him. Should Dr. B see the patient independently, or should he ask Dr. A to be present and to see the patient jointly? Suppose Dr. A refuses to call in Dr. B at the desire of the relatives, what is the position of Dr. A? Is he guilty of professional discourtesy?—Yours, etc.,

B. N. GHOSH, F.R.F.P.S. (Glasgow).

9, TALTOLE LANE,
CALCUTTA.

13th June, 1928.

(Note.—We are glad that our correspondent has raised this question, for there can be little doubt that medical ethics are honoured in the breach rather than in the observance in Calcutta. The Bengal Medical Council is less active in this matter than the Bombay Medical Council, probably owing to the fact that fewer actual instances are reported to them. In a city which is overstocked with medical practitioners irregularities are bound to occur, but the frequency with which they do occur is deplorable.

To turn to the specific questions asked by our correspondent; (i) Dr. B should certainly not examine or prescribe for the patient, if he knows that Dr. A has been there previously.

(ii) Dr. B has no business at all to steal the patient from Dr. A; though we regret to say that such a practice is not at all uncommon in India. He should refer the matter to Dr. A. On the other hand, if the relatives ask Dr. A to call in Dr. B he will be well advised to do so, whatever his own private opinion is of Dr. B. Courtesy between medical men is essential, and if the relatives desire a second opinion, their desire should be complied with.

(iii) Dr. B should refer the matter to Dr. A before seeing the patient. If the relatives definitely inform Dr. A that they do not wish him to hold further charge of the case, they are at liberty to call in whom they like.

The medical profession is often accused of being a "trade union"; but unless the etiquette and conventions of medical practice are to be observed, progress is impossible. Dr. B can supplant Dr. A only if Dr. A asks him to do so; or if the relatives clearly give Dr. A to understand that they do not desire him to attend the patient any longer. Yet, the greatest difficulty which the medical practitioner experiences is not that from a rival practitioner, but from the relatives themselves. For the consultant, a wise rule is not to see the patient unless he brings a letter from his own medical adviser.—EDITOR, I.M.G.)

THE LIVER TREATMENT OF PERNICIOUS ANÆMIA.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—It is a commonplace that nothing is ever new and the recent discovery of the successful treatment of pernicious anæmia by the administration of liver, reminds me of an incident which occurred some years back.

In 1924, there was confined in the jail in Akola (Berar) a batch of Pathan prisoners from the N. W. Frontier under long terms of sentence. In the months of May and June three of these men complained of night blindness, which they said usually affected them in the hot weather months and begged for two ounces of liver which they said was a specific for this complaint. As I was previously in the Mandla District where night blindness is very common amongst the aborigines and is soon cured with a few days' administration of cod-liver oil or even with just the addition

of ghee or tili oil in their food, I ordered cod-liver oil to be given to these men, treating their request for liver as but the natural craving for flesh of men who were used to it and were now on an enforced vegetarian diet. This did the prisoners no good—at least so they said—and they again begged of me, after a week of cod-liver oil, to allow them the small bit of liver which had never failed to cure and was much in vogue in their country. Out of a batch of 25 men only three complained of this blindness and one of them was an elderly man, and as the quantity of liver asked for was small—only two ozs. per man—I ordered it to be given. Two days later I was told—as I anticipated—that the blindness was cured. The liver was eaten practically raw.

Was there something in it after all? Medical men working on the Frontier may know something about this.—Yours, etc.,

J. M. RICHARDSON, I.M.S.,
Civil Surgeon.

NARSINGPUR,
10th June, 1928.

Service Notes.

APPOINTMENTS AND TRANSFERS.

THE services of Lieutenant-Colonel A. G. Tresidder, C.I.B., M.D., I.M.S., are placed permanently at the disposal of the Government of Bombay with effect from the 1st April, 1928.

Lt.-Col. A. H. Napier, I.M.S., is appointed to be Civil Surgeon of Gaya with effect from the forenoon of the 3rd May, 1928.

Lt.-Col. P. S. Mills, I.M.S., is appointed to officiate as Civil Surgeon of Ranchi with effect from the 29th April, 1928 and to hold collateral charge of the duties of the Superintendent of the Radium Institute.

The following officers of the Indian Medical Service are appointed substantively to be Agency Surgeons under the Government of India in the Foreign and Political Department, with effect from the dates shown against their names:—

Captain H. J. H. Symons, M.C., 23rd November, 1927.
Captain A. K. Sahibzada, 28th April, 1928.

PROMOTION.

The promotion to his present rank of Major W. A. M. Jack, O.B.E., M.B., I.M.S., notified in Army Department Notification No. 1557, dated the 5th August, 1921, is antedated from the 31st July, 1921, to the 31st January, 1921.

The promotion to his present rank of Major B. C. Ashton, M.B., I.M.S., notified in Army Department Notification No. 1552, dated the 17th December, 1926, is antedated from 23rd November, 1926 to 23rd May, 1926.

Captains to be Majors.

P. A. Dargan. Dated 12th May, 1928.
C. M. Nicol, M.D. Dated 14th May, 1928.
L. Blake, M.C. Dated 22nd May, 1928.
D. R. Thomas, M.B. Dated 30th November, 1927.

LEAVE.

Major S. M. Hepworth, I.M.S., Acting Superintendent, X-Ray Institute, Dehra-Dun, is granted leave on average pay for 14 days, combined with furlough under military rules for 16 days with effect from the 4th June, 1928, or the subsequent date on which he avails himself of it.

Major B. G. Mallya, I.M.S., Superintendent, Alipore Central Jail, was granted by the High Commissioner for India an extension of leave on half average pay (not due) for eleven days, with effect from the 17th May, 1928.

Captain A. K. Sahibzada, I.M.S., Agency Surgeon, North Waziristan and Medical Officer, Tochi Scouts, is granted one year's combined leave (6 months' leave on average pay combined with 6 months' study leave) with effect from the 21st May, 1928, forenoon.

RETIREMENT.

His Majesty the King-Emperor has approved the retirement of Licut.-Colonel E. L. Ward, C.B.E., I.M.S., with effect from the 28th April, 1928.

NOTES.

THE BRITISH HANOVIA QUARTZ LAMPS.

MESSRS. MALGHAM BROS., the agents in India of the original makers of mercury vapour lamps—the British Hanovia Quartz Lamp Co., Slough, England—write to us to claim that the mercury lamps manufactured by this firm have been fitted up in several hospitals in Bombay and elsewhere in India, and that they have received very satisfactory reports with regard to their use. They further state that they are prepared to install one of these outfits free of charge in any Bombay hospital for a short period in order that an entirely independent opinion may be obtained with regard to the efficacy of the lamps. If any Bombay hospital desires to avail itself of this offer, will the Superintendent kindly communicate with the firm—Malgham Bros., 19, Bank Street, Fort, Bombay? We would welcome any such independent opinion for publication, since one knows from experience that there are several cheap and inefficient models of ultra-violet ray apparatus on the Indian market to-day, and the practitioner who uses this form of therapy would do well to order his lamps only from firms of unquestionable standing, of which the British Hanovia Quartz Lamp Co., are a leading example.

HEWLETT'S ANTISEPTIC CREAM.

WE have received from the well known firm of C. J. Hewlett and Son, 35—42, Charlotte Street, London, E. C. 2, samples of their antiseptic cream (Cremor antisepticus, Hewlett's). This most elegant preparation is certain to interest medical men in India. It is put up in collapsible tubes, and is guaranteed to be absolutely free from animal fat of every description, and therefore suitable for the most fastidious type of Indian patient. It contains zinc and boracic acid, is of a white colour, and pleasant to use. As an emollient healing cream for use for cuts, burns, wounds, abrasions and skin eruptions it seems to be ideal, and several reports by medical men speak very highly of its use.

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SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

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Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

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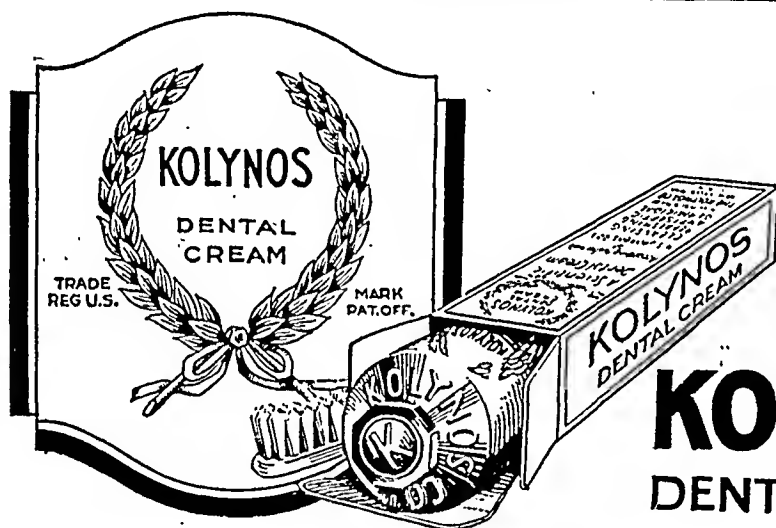
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WITH THE GOVERNMENT OF BENGAL.

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SEVENTH CONGRESS

3245

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The 7th January, 1928.

Messrs. Bengal Immunity Co., Ltd.,
153, Dharamtollah Street, CALCUTTA.

Dear Sir,

On behalf of our Local Committee, I beg to thank your firm for their assistance during the Far Eastern Association of Tropical Medicine 7th Congress just concluded. The demonstrations at your laboratories were very much appreciated by the members who attended, who had an opportunity of seeing what local enterprise could do in biological research and production.

Yours faithfully,

(Sd.) G. TATE,

Major-General, I.M.S.,
Surgeon-General with the Government of Bengal.

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Original Articles.

RAT-BITE FEVER AS AN INDIAN DISEASE.

By R. KNOWLES,

LIEUTENANT-COLONEL, I.M.S.,

Professor of Protozoology,

and

ASST. SURGN. B. M. DAS GUPTA,

Assistant Professor of Protozoology,
Calcutta School of Tropical Medicine and Hygiene.

RAT-BITE fever, due to *Spirillum minus*, is usually regarded as a somewhat rare disease. It is known to be of world-wide distribution and is said to be especially prevalent in Japan. Yet, in the course of ordinary routine work, during the last seven and a half years, we have seen no less than twenty-eight cases of this supposedly rare disease, of which we have preserved detailed notes, in addition to several others of which no detailed notes have been kept; and this is our reason for writing the present paper, for we believe true rat-bite fever to be much commoner in India than is usually realised. In Calcutta, at least, bites from rats appear to be very frequent. Everywhere throughout the city, and especially in the Kidderpore district, there are accumulations of *bustis* and slums swarming with rats, where people sleep on the earthen floor or on *charpoy*s only slightly raised above the ground level. Even in the better class houses, there is no attempt to keep the grain and other food supplies in rat-proof receptacles, and most Calcutta houses are overrun with rats, whilst bandicoots abound in most Calcutta compounds. A considerable number of persons bitten by rats come to the Pasteur Institute at Calcutta every year, only to be informed that they are in no danger of contracting hydrophobia.

Apparently what happens in the great majority of cases of rat-bite is that the lesion heals up and no further trouble is experienced. In some cases secondary septic infection occurs, giving rise to fever with rigors; in these the fever is due to sepsis and not to infection with *Spirillum minus*, and several such cases are seen every year in the Protozoology Department of the Calcutta School of Tropical Medicine and Hygiene. These cases clear up on the application of fomentations and are not instances of true rat-bite fever. In some, however, true rat-bite fever sets in with a relapsing temperature chart. As we shall show later, in a few instances there may be a primary relapsing fever due to *Spirillum minus*, with a secondary fever due to septic infection of the wound superadded, and in these cases the true diagnosis may be very difficult to arrive at and the temperature chart most misleading. The type of fever due to simple septic infection of the bite follows

the usual course of a fever due to sepsis, and we do not propose to deal with it here. Of the twenty-nine cases of which notes are given in this paper, *Spirillum minus* was isolated from twenty-five, whilst our reasons for including the four other cases in the series will be given later.

In giving details of this series of cases, we do not propose to attempt to put together a complete memoir on the disease, but only to give a historical introduction referring to previous observations on it by workers in India. What we desire to emphasise is that rat-bite fever is a relatively common disease in India, and one which should not be overlooked by the general practitioner. For fuller accounts of the disease in general we may refer the reader to the papers by Robertson (1924), who gives a full account of the parasite; by McDermott (1928), who gives a very full and detailed account of the disease and of the parasite, together with a complete bibliography; the account in the 8th edition of Manson-Bahr's *Manual of Tropical Diseases*; and that by Bass (1922) in Vol. II of Byam and Archibald's *Practice of Medicine in the Tropics*.

PREVIOUS OBSERVATIONS ON RAT-BITE FEVER IN INDIA.

As pointed out by Robertson (1924), the parasite of rat-bite fever was first discovered in the blood of a rat (*Mus decumanus*) by Vandyke Carter in Bombay in 1887. He described its morphology and movements very accurately, and rightly considered it a spirillum and not a spirochæte. He named it *Spirillum minor*, but the correct name should be *Spirillum minus* (Carter, 1887). Lingard (1899) found what was almost certainly the same spirillum in the blood of a bandicoot (*Mus giganteus*) in the Punjab and inoculated it into rabbits and guinea-pigs. Wenyon (1906) described a spirochæte in the blood of mice and named it *Spirochæta muris*. Morphologically this organism is probably identical with *Spirillum minus*. Breinl and Kinghorn (1906) found a spirochæte in the blood of a mouse inoculated with *Trypanosoma dimorphon*, and also found the same spirochæte in the blood of a wild mouse. They considered that this spirochæte was smaller than that described by Vandyke Carter and accordingly differentiated it as a new species, *Spirochæta laverani*. It is interesting to note that it was this organism that Ehrlich and Hata used in their classical experiments on the chemotherapy of spirochætal infections which led to the discovery of salvarsan.

Several of the earlier workers, such as Hata (1912), Surveyor (1913), Oda (1915) and Crohn (1915) suspected the spirochætal nature of rat-bite fever, but the first proof that this was the case was supplied by Futaki, Takaki, Taniguchi and Osumi in 1916, who isolated the organism from man, demonstrated it under the dark ground, and successfully inoculated monkeys, guinea-pigs and white rats. They named the organism *Spirochæta morsus muris*. Since that date it has been fully confirmed by many workers

that the cause of rat-bite fever is a spirillum, *Spirillum minus*. With the morphology of this parasite we shall deal later.

In searching through the literature, it is a little difficult to discover who was the first person to record the occurrence of rat-bite fever in man in India. In an editorial in the issue of the *Indian Medical Gazette* for September 1912, p. 370, the editor writes: "We in India are only too well aware of the fact that rats are disseminators of plague, but few have seen or even read of cases of a disease produced by the bite of a rat"; he then goes on to describe the symptoms of the disease as observed in the early Japanese cases. There is no mention of the disease in the Annual Report for 1913 of the Bombay Bacteriological Laboratory, but in the corresponding report for 1914 it is casually mentioned that the disease was being treated at Parel by injections of salvarsan. The discovery of the disease in man in India therefore appears to have been made about 1913.

Savant (1913) in a letter to the *Indian Medical Gazette* draws attention to cases of rheumatism persisting for one or two months after the bite of rats; and the cases with which he was dealing clearly appear to have been cases of true rat-bite fever. They occurred in Dewas, Central India. Surveyor (1913) gives a full account of a case referred to him by Dr. C. Fernandes of Bombay, and remarks that he had seen a similar case twelve years previously. The patient was cured by intramuscular injections of neosalvarsan. The patient was much emaciated when first seen, and the disease had lasted for two years; she put on 29 lbs. under treatment. The Wassermann reaction was completely negative. The urine contained albumin, a few leucocytes, granular casts and red corpuscles. The patient's serum was injected into the scrotum of two rabbits as the author considered that the disease might be of spirochaetal origin, but no spirochaetes were detected in these animals. [The rabbit indeed is not nearly as susceptible as the guinea-pig or white mouse, though McDermott (1928) records successful inoculation of rabbits by subcutaneous inoculation at the base of the ear or in the genitalia.] de Mello and Menezes (1917) described a case of rat-bite fever which occurred in Goa, and de Sousa (1917) a second case in Goa. Unfortunately we have not had access to either of these two papers, but neither author appears to have isolated the spirillum. The credit for first demonstrating the existence of *Spirillum minus* in man in India belongs to Row (1917). He remarks that "rat-bite fever comes under clinical observation fairly frequently in Bombay, but it is a rarity to have a case in the early and acute stage of the disease." He described the cutaneous lesions of the disease and demonstrated the spirillum in two mice inoculated with a minute quantity of citrated blood and lymph squeezed from a papule of the patient. He considered that, as this spirillum was only 2μ to 3μ in length, with only two or three coils, it differed from the Japanese one. In his second paper

(Row, 1918) he gives an account of five cases, with a good description of the cutaneous lesions; in this paper he again adheres to his opinion that the Indian spirillum differs from the Japanese one in its morphology. (His third paper we have unfortunately not had access to.) In his fourth paper (Row, 1922) he notes that the Wassermann reaction is negative in the disease, and states that he had not succeeded in infecting mice by inoculation of the patient's blood. He considers that the Bombay spirillum is less pathogenic to guinea-pigs and rats than the Japanese strain, and that it differs from it in morphology.

In the meantime, Powell and Bana (1918) described the successful treatment of cases of rat-bite fever by injections of sodium cacodylate, a drug which they remark is much cheaper than salvarsan—and mentioned that Row isolated the spirillum from one of their cases. Briggs (1922) recorded a case in a havildar in the Indian Army, cured by a single intravenous injection of 0.2 gramme of novarsenobillon; the patient had a positive Wassermann reaction, which immediately became negative after treatment. He states that the patient showed no evidence of syphilis. Chaudhuri (1923) records a case where the oedema and induration at the site of the bite were so severe that a carbuncle was suspected and an incision made, but no pus was evacuated. Severe rigors were present, but the case yielded promptly to a single neosalvarsan injection.

Spaar (1923) records two cases which occurred in Colombo. Two guinea-pigs injected from the first patient both died from sepsis, and no animals were inoculated from the second. Headache is mentioned as one of the most distressing symptoms of the disease. Neosalvarsan treatment was eminently successful.

Parmanand's first paper on the disease appeared in 1923, and is illustrated by admirable photomicrographs. He described four cases. In the first, spirilla were demonstrated in serous exudate from the local lesion; none could be demonstrated in the second case, which, however, was a typical one and showed a blotchy red eruption. Two white mice and a guinea-pig inoculated from the third patient showed spirilla eight days later, and also two white mice from the fourth patient. The material inoculated was serous exudate from the local lesions, and the injections were given subcutaneously. He gives a good description of the morphology of the spirillum, and remarks on its great activity when seen under the dark ground. The ends are tapering and there is a single terminal flagellum at each end. Division is by binary transverse fission.

Mehta (1924) gives a good clinical account of a typical case, but no attempt was made to demonstrate the spirillum. Treatment by intramuscular injections of sulfarsenol quickly cured the patient.

An important contribution to the study of the disease as it occurs in India is Parmanand's

second paper (Parmanand, 1925). He confirms an observation previously made by the present writers that the best method of maintaining a strain in mice is to inoculate the mouse with a mixture of the cardiac blood and ground up spleen emulsion of the previous infected mouse. He finds that the experimental disease is very fatal in guinea-pigs, killing them as a rule in about three and a half months. An investigation of the degree of infection of Bombay rats gave the following results:—

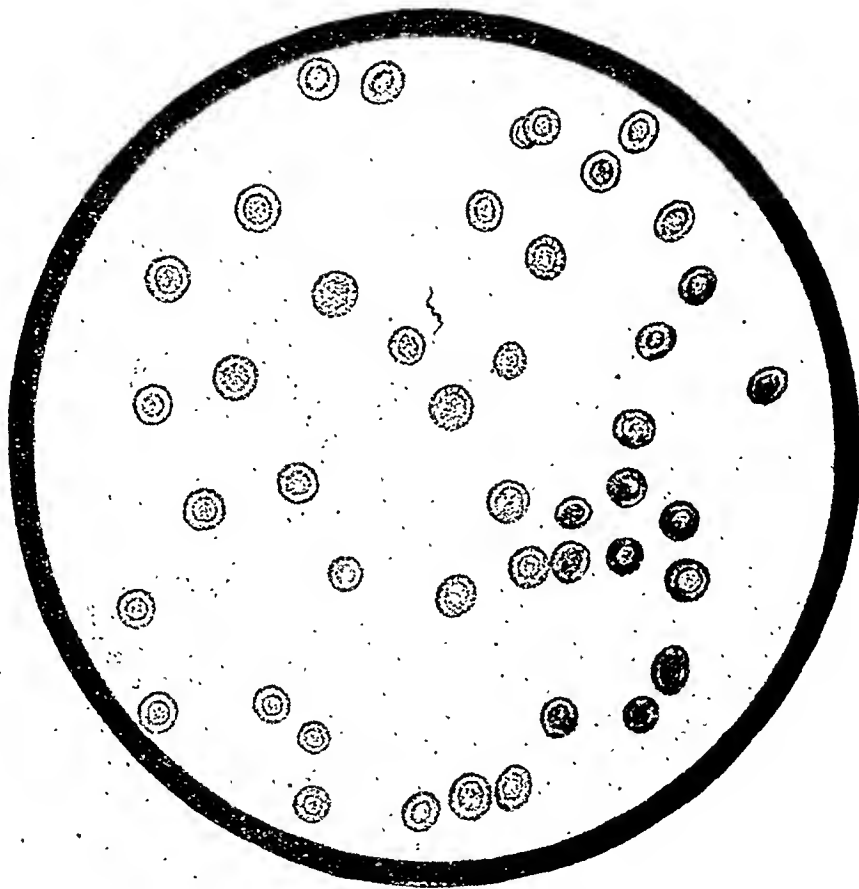
Mus rattus: 100 examined; 2 found infected.

Mus decumanus: 100 examined; none found infected.

Norvegicus bengalensis: 100 examined; 11 found infected.

that the Indian strain of *Spirillum minus* differs from the Japanese strain.

Into the controversy between Row (1917, 1918, 1920, 1922, 1924, 1925, 1926) and Parmanand (1923, 1925) with regard to the morphology of the Indian strain of *Spirillum minus*, it is unnecessary to enter, as the matter is now one of historical interest only. Colonel Row deserves every credit for his work on the disease as it occurs in India and for demonstrating the existence of the parasite in man in this country; while Dr. Parmanand is to be congratulated on his very careful and accurate observations on the disease and on the natural hosts of *Spirillum minus*. As shown in the text figure, however, there is no doubt at all, that the Indian strain of



Spirillum minus as seen in a blood film from an infected mouse. Stained by Tribondeau's modification of Fontana's stain. Note the terminal flagellum at each end.

He concludes that the lesser bandicoot, *Norvegicus bengalensis*, is the principal host of *Spirillum minus* in India. No spirilla were detected in smears from the salivary glands of the infected rats. Three of the bandicoots which showed spirilla in their blood also showed them in smears of kidney substance. He gives a tabular comparison of the morphology of the Indian and Japanese strains, and comments that the spirilla are more easily found in stained films than by examination by the dark ground. The spirilla isolated from naturally infected rats are morphologically identical with those isolated from human cases. He criticises Row's contention

that the Indian strain of *Spirillum minus* corresponds exactly in morphology to the Japanese strain, and that Row's contention is wrong. The flagella are difficult to stain, however, and require special methods for their demonstration: a matter to which we shall revert later. Hence Row's proposed name for the Indian spirillum, *Spirochæta petit*, becomes synonymous with *Spirillum minus*.

Having given a résumé of the previous work on rat-bite fever as an Indian disease, we will next proceed to give a brief résumé of the 26 cases that we have ourselves observed between

1920 and 1928. In order to make these notes as brief as possible, we have included a large number of temperature charts, a study of which will show the typical course of the fever better than any written description.

OUR OWN CASES.

Having summarised the previous papers dealing with the disease as observed in India, we may next give a brief clinical account of our series of 26 cases, taking them in historical sequence.

Case 1 (1920).—This was the first case which either of us had encountered during the course of some 12 years of medical work in India, and was seen at the Pasteur Institute, Shillong, in 1920. He was a Hindu male, aged 45, a Marwari merchant. Whilst sleeping at

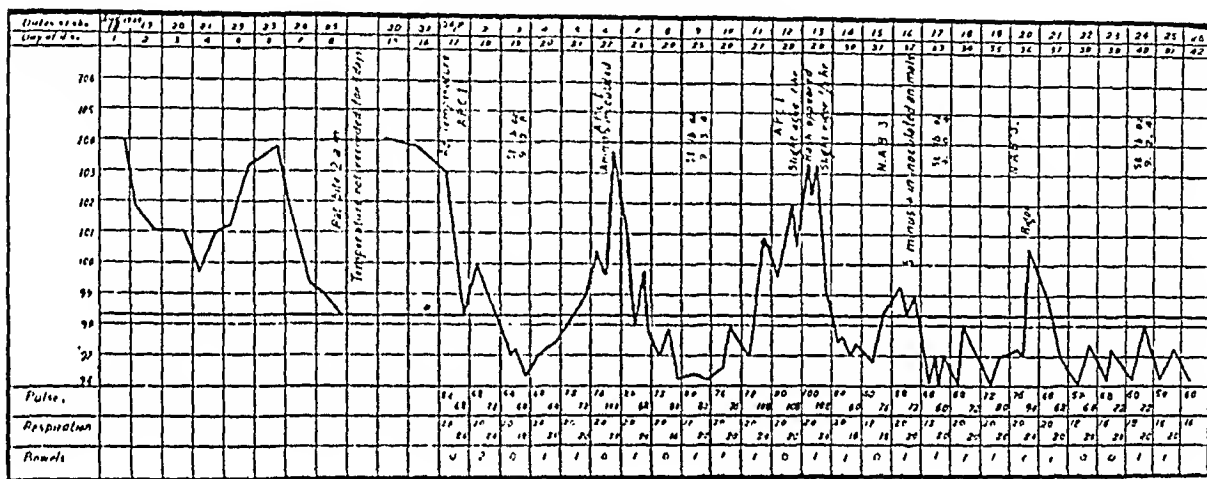
swollen, and there was difficulty in swallowing. No skin eruption was noticed, but there was pain in the joints, especially in the upper limb. There was marked constipation.

On the 19th day an incision was made into the site of the bite, films made from the sanious fluid which oozed out, and searched for spirilla, with negative results. The finger blood was examined daily for four days, with negative findings. Finally, on the 20th day after the bite, $\frac{1}{2}$ c.c. of blood was taken from the median basilic vein and injected subcutaneously into two white mice. One of these mice was killed 16 days later. Its spleen was found to be enormously enlarged. Smears from the cardiac blood showed typical *Spirillum minus*. The patient was not treated with salvarsan, and the case was subsequently lost sight of.

The above two cases were seen at Shillong. The remaining cases were all seen at Calcutta during the years 1924 to 1928.

CASE 3.

Name—Mr. J., European male.



night on a bamboo *machan* he was bitten by a rat. He applied cold compresses during the night, and the next morning had the bite cauterised with nitric acid at the Shillong Dispensary. This resulted in a local patch of necrosis, but the ulcer healed up in some ten days' time.

Two weeks after the bite he got fever with rigor, the fever lasting three or four days. The fever then subsided, only to recur a week later, with pain in almost all the joints of the body and enlargement of the glands in both axillae. When seen in this second attack of fever he was completely prostrated. (At the time we knew nothing of the technique for demonstrating the spirillum.) Blood films were searched for *Spirillum minus*, but none were found. He was diagnosed as a case of rat-bite fever on clinical grounds and three injections of novarsenobillon given, one a week for three weeks. The fever and joint pains completely disappeared after the first injection, and he made a complete recovery.

Case 2 (1928).—This case has previously been reported from Shillong in this journal by the junior author (Das Gupta, 1922), but for the sake of completeness, notes on the case may be included here.

Mrs. G., a Hindu lady, about 20 years of age, was bitten by a rat on the forehead on the night of the 19th December, 1921. The wound healed up in two days' time. On the 9th day after the bite the site of the bite became oedematous; fever set in, with a temperature varying from 101° to 102.8°F. and severe pain was felt at the site of the bite. On the 12th day the temperature dropped to normal and the pain disappeared, but the oedema persisted. Four days later fever recurred and lasted for six days. Severe pain was felt at the site of the bite and the glands on both sides of the neck, the parotid and submaxillary glands became

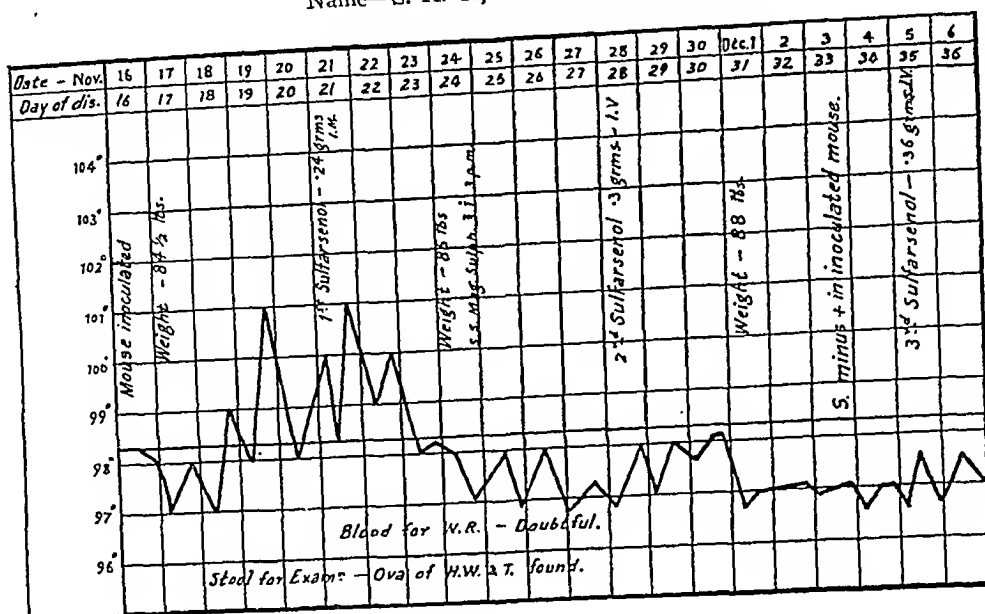
Case 3 (1924).—This case was a most interesting one. The patient, Mr. J., a European police officer, lived with three other bachelors in a large 'chummary' in Alipore, close to Kidderpore (in which area, as we shall describe later, a considerable proportion of the local rats are infected). Despite the fact that three Irish terriers were kept in the house, it was overrun with rats.

Mr. J. took ill with high fever and pain in the back on the 15th August, 1924 and went to bed. The fever dropped to normal on the 24th August. That night the patient was suddenly awakened from his sleep by a rather severe bite on the right forearm; he did not see the animal that bit him, but thought that it was probably a rat. The next day the temperature rose to 104°F., and the patient was admitted to the Presidency General Hospital, Calcutta.

On admission, there was a small swelling with a central vesicle in the middle of the front of the right forearm, with swelling and tenderness of the right supratrochlear gland. The oedematous part was incised, films prepared and searched for spirilla, but none were found. The subsequent temperature was as shown in the chart. On the 7th September the temperature dropped to normal and the local swelling subsided. On the 11th, the patient had his fourth attack of fever, but without local symptoms. On the 12th—nineteen days after the bite—a purplish blotchy rash appeared on the left forearm, and on the following day spread all over the body and limbs. It consisted of mulberry-coloured spots, varying in size from that of a pea to that of a two-anna bit, the spots being discrete and scattered all over, but tending to run together on the back. On the morning of the 14th the temperature again dropped to normal and the eruption faded away almost completely.

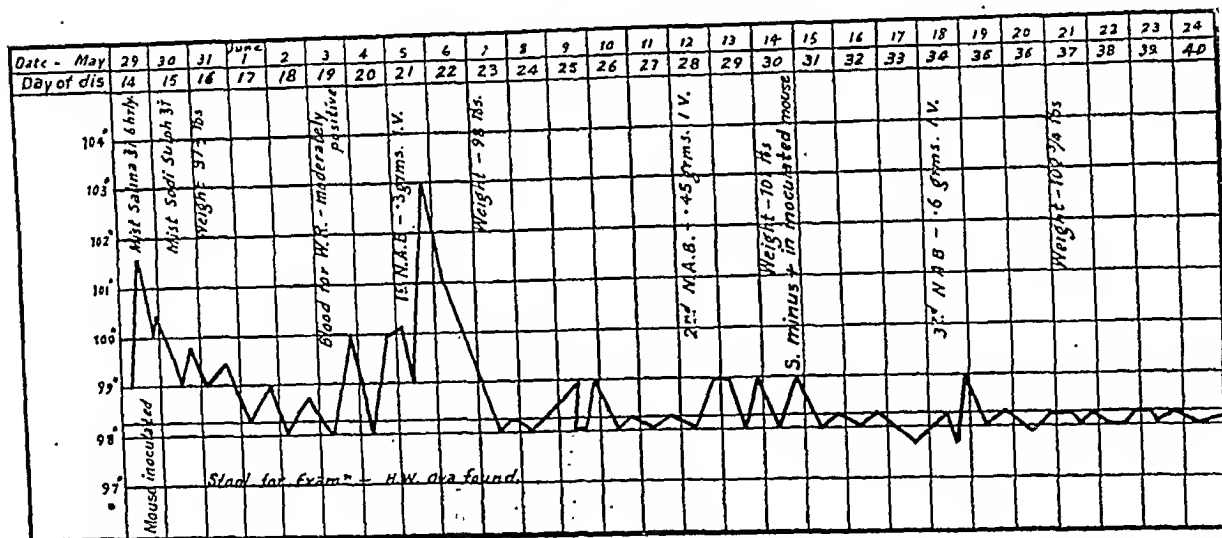
CASE 4.

Name—S. K. G., Hindu male, age 16 years.



CASE 5.

Name—P. P., Hindu male, age 40 years.



The authors were called in in consultation on the 6th September, when the fever was at its height, and thirteen days after the bite. The case appeared to a very abnormal one and, despite the history of the bite, it appeared as if the fever might be due to sepsis, or be one of the enteric group. A guinea-pig and a mouse were inoculated with blood from the elbow vein, and both animals showed *Spirillum minus* in their blood ten days later. Other laboratory findings were as follows:—

Blood films for malaria parasites: 1st and 13th September: negative.

Wassermann reaction: 15th September: completely negative.

Widal reaction: 16th September: + to *B. typhosus* at 1 : 32 and to *B. paratyphosus B* at 1 : 8, but negative at all higher dilutions.

The patient was treated with novarsenobillon and made a rapid recovery.

(We are very much indebted to Major H. E. Murray, I.M.S., lately Surgeon Superintendent, Presidency General Hospital, for details concerning this patient and for permission to publish the notes on the case.)

Case 4 (1925).—S. K. G., Hindu male, aged 16, was bitten at night by a rat on the left foot. To stop the hæmorrhage he applied dust to the wound. Next day

the part was inflamed and very tender, and hot boracic compresses were prescribed by a doctor whom he consulted. Two days later, pus issued from the wound and the swelling subsided. On the 16th day after the bite, the site of the bite again became tender and swollen, and fever set in with rigor. The glands in the left groin were swollen, and he was admitted to hospital the same day. The subsequent course of the fever was as shown in the chart of the case. The laboratory findings in this patient were as follows:—

A mouse inoculated with the patient's blood on the day of admission showed *Spirillum minus* in its blood 17 days later.

18th November.—Thin and thick blood films showed neither malaria parasites nor spirilla.

Smears from the local lesions showed no spirilla.

The stools showed hookworm ova, but no protozoa.

21st November.—Wassermann reaction: doubtful.

Urine clear; shows neither albumin nor sugar.

The patient received three injections of sulfarsenal and made a rapid recovery. He gained 3 1/2 lbs. whilst in hospital.

Case 5 (1926).—P. P., Hindu male, a cook, aged 40. The patient was sleeping on the verandah of his house one night when he was suddenly awakened up by being

bitten on the leg. He got up and lit a lamp and saw a rat sitting on the floor beside his bed. There was considerable bleeding from the bite and he applied cold compresses. Five days later the leg was considerably swollen, and fever with rigor set in on the 10th day after the bite. The patient states that the fever was so high that he became unconscious. The fever then dropped, but not quite to normal, and a low fever persisted for a week. A second attack of high fever now set in and a rash came out all over the body and neck. He was admitted to hospital on 29th May, 1926, about fourteen days after the bite. The subsequent course of the fever was as shown in the chart. The laboratory findings were as follows:—

29th May.—Mouse inoculated with the patient's blood showed *Spirillum minus* on the 14th June.

31st May.—Stool shows hookworm ova, but no protozoa.

30th May.—Urine normal, no albumin or sugar.

11th June.—Wassermann reaction: moderately positive.

The patient was treated with four injections of novarsenobillon, as shown in the chart, and made a sound recovery. He put on 6½ lbs. whilst in hospital.

Case 6 (1927).—(This was a case under the care of Dr. M. N. Mullick, Registrar to the Carmichael Hospital for Tropical Diseases, seen by the junior author in consultation. We are indebted to Dr. Mullick for the notes on the case and for his kind permission to publish them.)

G. G., Hindu male child, 6 years of age, was bitten by a rat on the 2nd April, 1927. The wound healed up a few days later. His first attack of fever set in on the 17th April and lasted till the 23rd April, the temperature varying between 101° to 104°F. He was then afebrile until 2nd May, when the second attack of fever set in and lasted for three days. A third attack of fever set in on the 11th May and lasted till the 13th May. A fourth attack occurred from the 13th June till the 16th June. A fifth attack occurred on the 1st August.

Two mice were inoculated with the patient's blood on the 22nd April—the 20th day after the bite—and both showed *Spirillum minus* on the 5th May, thirteen days later. The other laboratory findings in the case were as follows:—

8th May.—Total R.B.Cs. 4,570,000 per c.mm. Total leucocytes 6,600 per c.mm. Differential leucocyte count: eosinophiles 8 per cent.; polymorphonuclears 43 per cent.; small mononuclears and lymphocytes 45 per cent.; large mononuclears 4 per cent.

20th May.—The urine shows a trace of albumin, hyaline and granular casts, a few pus cells and scanty red blood corpuscles.

The patient was treated as follows:—

14th May.—Novarsenobillon 0.1 gm. intravenously. Novarsenobillon was afterwards discontinued, when albumin was found in the urine.

8th June. Sallarsenol 0.015 gm. intramuscularly.

15th June. " 0.04 " "

21st June. " 0.06 " "

28th June. " 0.12 " "

17th July. " 0.12 " "

1st August. " 0.12 " "

17th August. " 0.12 " "

3rd September. " 0.18 " "

9th September. " 0.18 " "

20th September. " 0.18 " "

The child made a gradual recovery under this line of treatment and finally recovered. The case is of special interest, as showing how protracted cases of rat-bite fever can be. (An even better instance of this, however, is Case 15.)

Case 7 (1927).—K. R., Hindu male, aged 40, was admitted to hospital on the 1st August, 1927. He gave a history that a rat had bitten him on the right arm about two months previously, that fever had set in a week later and that since then he had had repeated attacks of fever off and on, each febrile attack being attended with pain and swelling at the site of the bite, with generalised

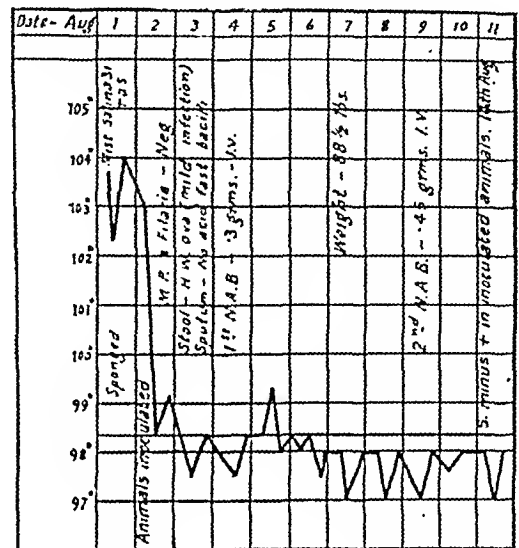
pain in the hands and legs. The course of the fever and treatment after admission to hospital were as shown in the temperature chart.

The laboratory findings in this case were as follows:—
30th July (when first seen as an outpatient). Thick and thin blood films: no parasites seen.

1st August.—Ditto.

CASE 7.

Name—K. R., Hindu male, age 40 years.



2nd August.—A guinea-pig and a mouse were inoculated with the patient's blood. Both showed *Spirillum minus* twelve days later.

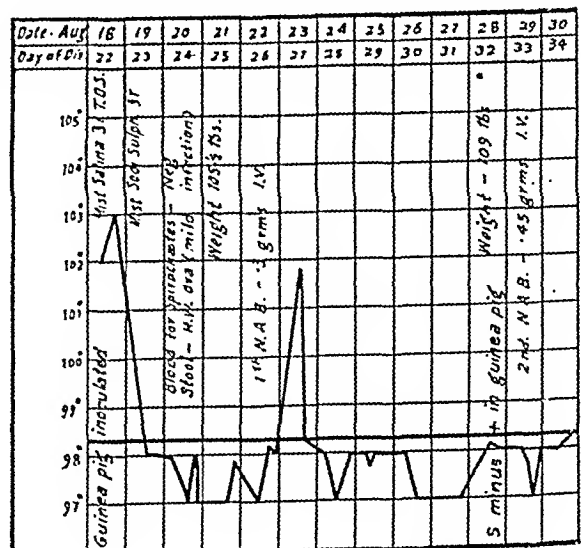
2nd August.—Sputum for tubercle bacilli; none found.

4th August.—Hookworm ova in the stool; no protozoa or pathogenic bacteria found.

The patient received two injections of novarsenobillon, 0.3 gm. and 0.45 gm. respectively, and made a rapid recovery.

CASE 8.

Name—M. A., Mahommedan male, age 30 years.



Case 8 (1927).—M. A., Mahommedan male, aged 30. The patient was bitten on the left thigh by a rat. Next morning the wound was touched with silver nitrate solution. Ten days later a swelling appeared at the site of the bite and fever set in with rigor. This lasted for three or four days and then subsided. Two further

febrile relapses occurred, each attended with pain and swelling at the site of the bite, and he was admitted to hospital on the 18th August, 1927, on the 22nd day after the bite. The subsequent course of the fever and the treatment were as shown in the chart. On the day of admission the patient had a rash, and serum was obtained from one of the measles-like spots and examined, but no spirilla were found. The other laboratory findings were as follows:—

18th August.—A guinea-pig was inoculated with the patient's blood and ten days later showed *Spirillum minus*.

18th August.—Thin and thick blood films: no parasites seen.

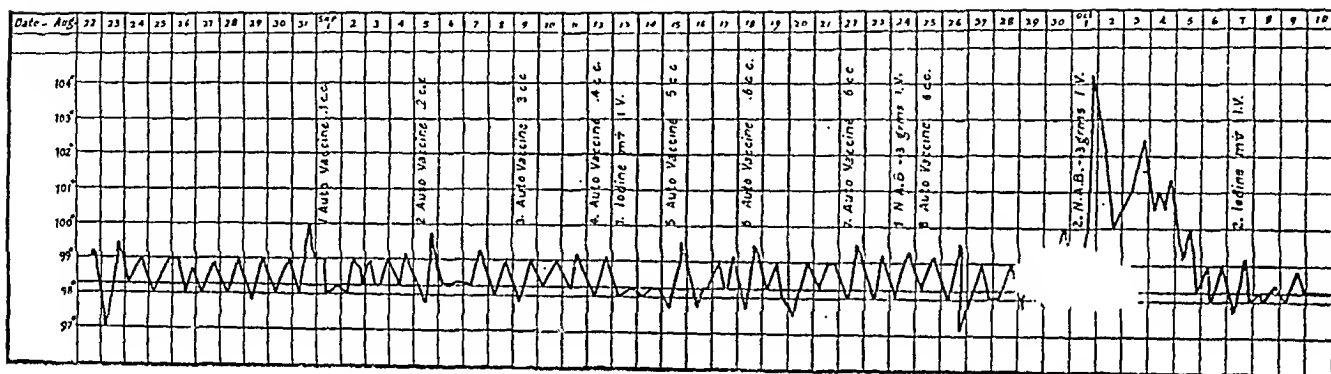
20th August.—Hookworm ova in the stool; no protozoa seen; no pathogenic bacteria on plating.

guinea-pig was inoculated with the patient's blood and never showed any *Spirillum minus*. The subsequent course of the fever was as shown in the chart. The stools were examined on fifteen occasions. No protozoa were seen at any time, and no dysentery bacilli isolated nor were tubercle bacilli demonstrated in the sputum. *Ascaris* ova were present, however, and this infection was treated. A hæmolytic streptococcus was isolated from the stools, and the patient received injections of an autogenous vaccine prepared from this source.

The blood was repeatedly examined for malaria, but with negative findings. The total leucocyte count was 5,600 per c.mm. The night blood was examined for filaria with negative results. The Wassermann reaction was moderately positive on 18th September. Intravenous iodine was tried, but did not control the fever.

CASE 9.

Name—S. D., Hindu female, age 60 years.



The Hughli Pilot Service maintain two pilot brigs—vessels which are beautifully fitted up and very comfortable—the “Fraser” and the “Lady Fraser.” Each brig in turn spends one month in the river at Calcutta and then one month at the Sandheads—about 10 miles from land, at the entrance to the Hughli—the vessels taking their turn of duty at sea, month and month about. The “Fraser,” which was at sea at the time, had been rather overrun with rats and these had been disposed of before she took her turn for duty at the Sandheads in the month in question.

On the evening of 22nd March, 1928, Mr. D. I. H. was sitting in the smoke room of the “Fraser” at the Sandheads, in pyjamas after dinner, reading the *Statesman*, when a rat suddenly ran out of the wain-scotting and bit him fairly severely on the right foot. The wound was immediately treated with tincture of iodine and dressed, and the patient travelled up to Calcutta as “passenger” on a ship the next morning. Unfortunately, he spent the next day shopping in Calcutta, and when first seen by the senior author on 24th March, was in considerable pain as the result. There was very great œdema of the foot and calf. The possibility of rat-bite fever was considered out of the question, as the bite had taken place at sea, and the patient was advised to lie up and dress the foot with hot fomentations.

On 6th April, sudden fever set in with rigor, swelling in the bitten foot and calf, and intense joint pains. The patient was admitted to hospital on the 9th April. On admission, he was in a drowsy state, complained of

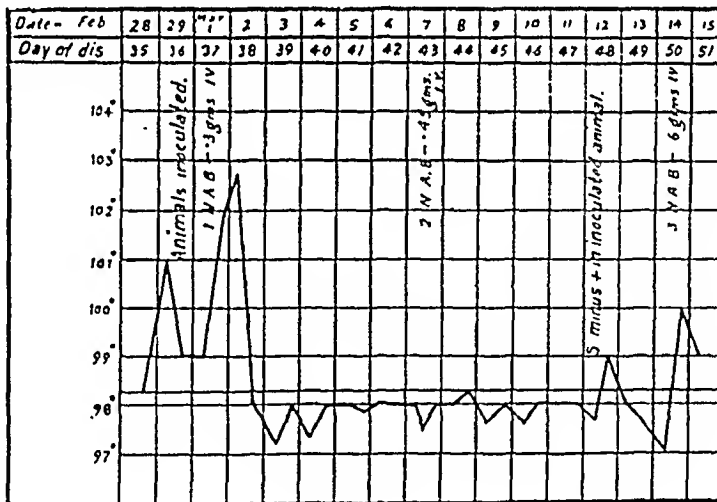
15th April, and a second dose of 0.45 grm. on 19th April, and made a speedy recovery.

Subsequent events on board the “Fraser” were rather amusing. During the same week, no less than three other pilots were bitten on the ship by rats. Of these, two never showed any symptoms, but the third went down with a very severe attack of fever and was admitted to another hospital in Calcutta, where we understand that a diagnosis of rat-bite fever was made. The ship was now trapped and 39 rats and one bandicoot were captured. The presence of the bandicoot is notable, since Parmanand (1925) has shown that the lesser bandicoot, *Norvegicus bengalensis*, is the special host of *Spirillum minus*. A supply of cats was procured and put on board ship. That night the Chief Officer, when coming out of his cabin, slipped on something soft on deck and clutched at the mercurial barometer to save himself. He “crashed,” bringing the barometer down with him. When he picked himself up, he discovered that what he had slipped on was a half-dead rat which one of the newly imported ship's cats had caught and laid at the door of the Chief Officer's cabin, apparently by way of compliment. A fresh mercurial barometer was indented for from the Meteorological Office, but arrived broken in transit down the river, and another had to be sent subsequently by special messenger.

Presumably, the rats on board the “Fraser” had become infected during the vessel's previous stay in the river at Calcutta, when the boat was coaling in Kidderpore docks.

CASE 11.

Name—S. P. S., Hindu male, age 35 years.



intense headache and vertigo, was irritable, and complained very bitterly about the habits of “the mau-eating rats of Bengal.” No rash was noticed at any time in this case. A guinea-pig was inoculated with the patient's blood on the 9th April, but showed no *Spirillum minus* on repeated examinations up to the 5th May, 1928. The subsequent course of the fever was as shown in the temperature chart. The other laboratory findings in the case were as follows:—

9th April.—Thin and thick blood films; no parasites seen. Total leucocyte count: 16,400 per c.mm. Differential leucocyte count: eosinophiles 0 per cent.; polymorphonuclears 73 per cent.; small mononuclears 25 per cent.; large hyaline mononuclears 2 per cent.

10th April.—Night blood for filaria: negative. Urine clear, sp. gr. 1018, no albumin or sugar.

12th April.—No protozoa, ova or pathogenic bacteria found in the stool.

Despite the failure to demonstrate *Spirillum minus* in the inoculated guinea-pig, the diagnosis was fairly certain. The patient was given 0.3 grm. novarsenobillon on

Case 11 (1928).—S. P. S., Hindu male, aged 35 years, was bitten on the right arm by a rat, whilst asleep at night. The wound healed up without any trouble. Twelve days later, however, the arm became very much swollen and painful, and high fever set in which lasted eight days. Since then, the patient stated that he had had periodical attacks of fever, each lasting for two or three days, with apyrexial intervals. The fever was preceded by rigor and followed by sweating. He was admitted to hospital on 28th February, 1928, about a month and a half after the bite, and the subsequent course of the fever was as shown in the temperature chart. The laboratory findings in the case were as follows:—

29th February.—A guinea-pig and a mouse were inoculated with the patient's blood. The mouse died on the second day from septic peritonitis, but *Spirillum minus* was found in the guinea-pig's blood on the 12th day. The night blood showed microfilariae present. No protozoa, ova or pathogenic bacteria were found in the stools.

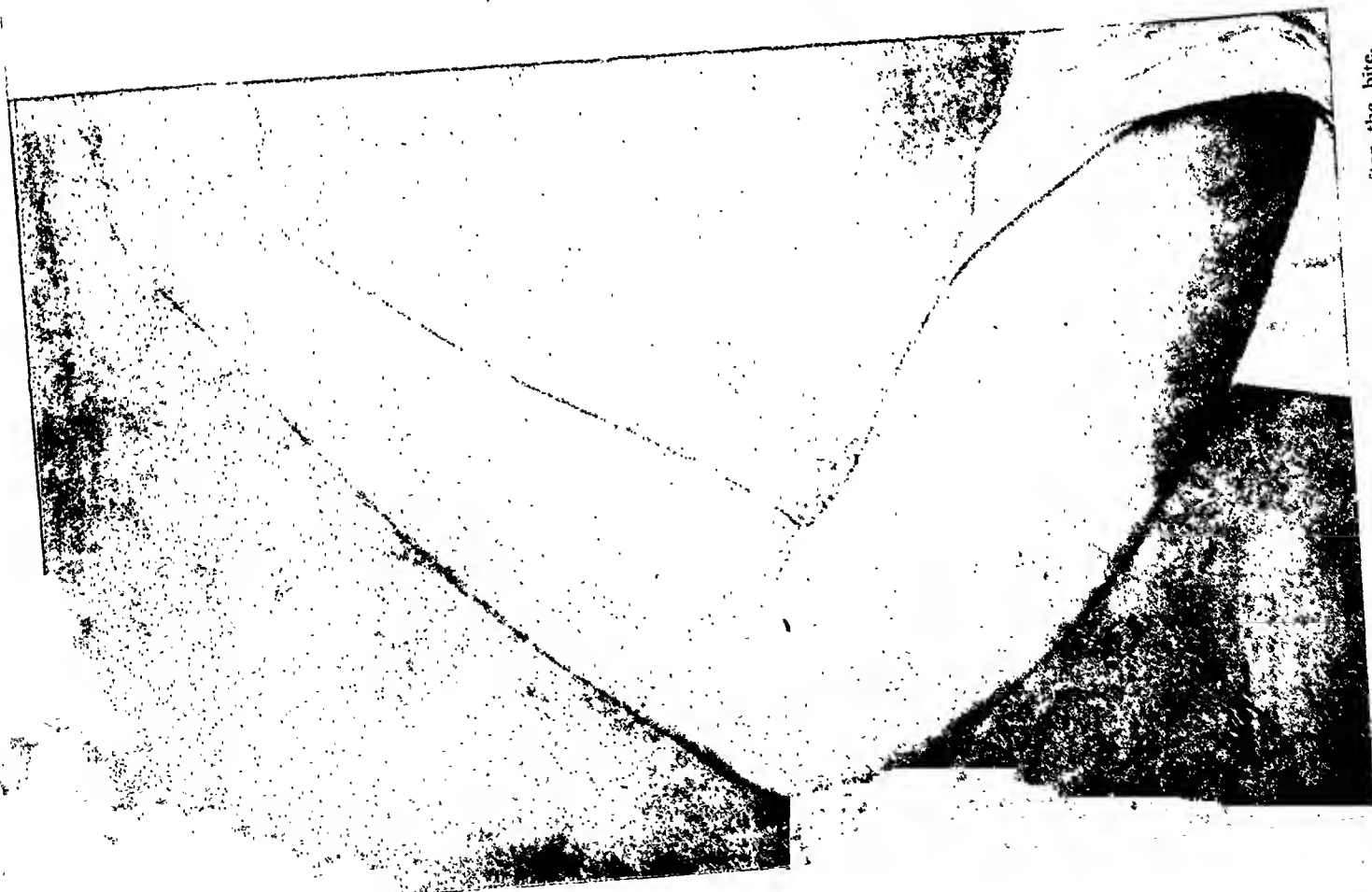


Fig. 2. The local lesion in Case 27; twentieth day after the bite. *S. minus* isolated from the lesion.



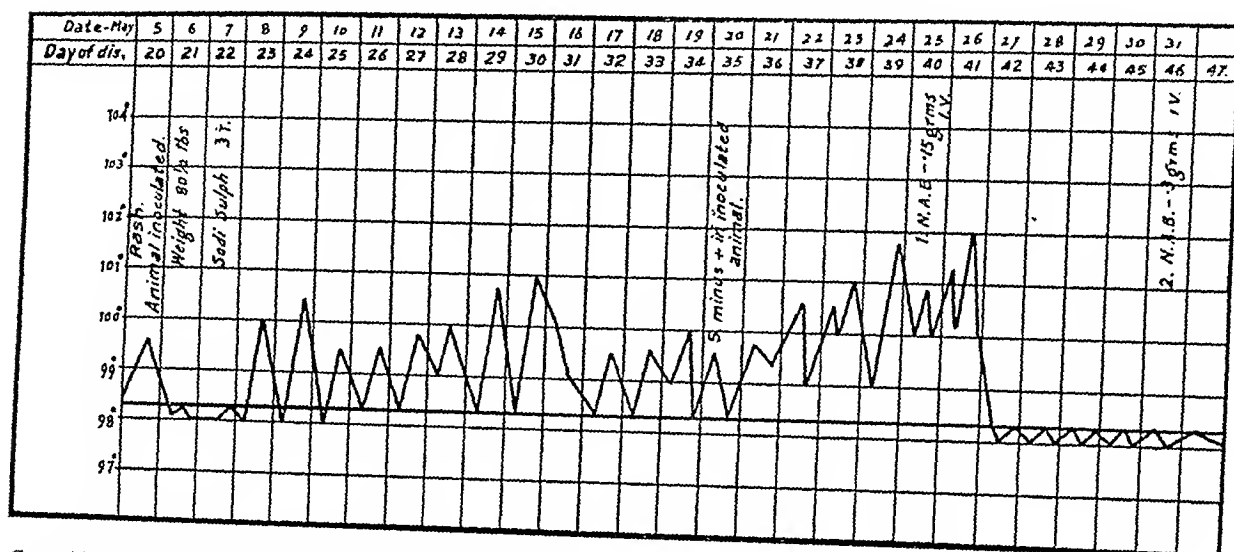
Fig. 1. The local lesion in Case 13; fifteenth day after the bite. *S. minus* isolated from the lesion.

The patient was treated with three injections of novarsenobillon, and left hospital on the 15th March, 1928.

standard guinea-pig strain of *Spirillum minus*, and caused immobilization of the spirochaetes within fifteen minutes. This was repeated on three other occasions and the result

CASE 12.

Name—N. B., Mahomedan female, age 52 years.



Case 12 (1928).—N. B., Mahomedan female, aged 52, was bitten on the dorsal and inner aspect of the left foot by a rat whilst she was asleep. She stated that she had fever for about five days after the bite, with enlargement of the left inguinal glands. The fever came on with a chill and was of intermittent character. There was a distinct periodicity, each attack of fever lasting for four or five days, with apyrexial intervals of about the same length between them.

This patient was first seen on the 20th day after the bite, and had slight fever on her admission, whilst there was a definite rash on the face and upper extremities. A guinea-pig was inoculated with her blood on the day of admission (5th May, 1928) and showed

was always positive. The further laboratory findings in the case were as follows:—

Thin and thick blood films taken at night for filaria on three occasions: negative.

5th May.—Wassermann reaction: completely negative.

7th May.—Stool showed hookworm and ascaris ova, and *Endolimax nana* cysts.

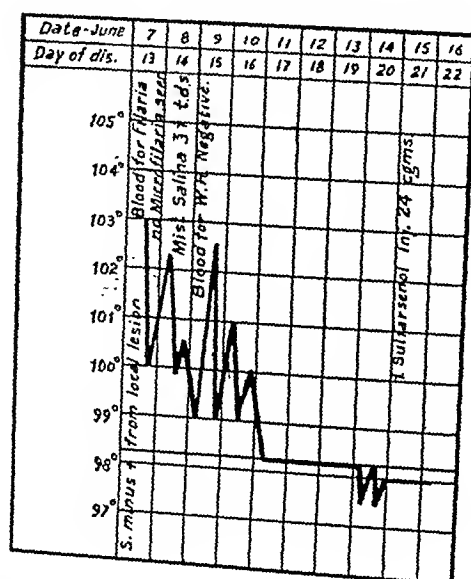
7th May.—Urine clear, no albumin or sugar.

25th May.—Thin and thick blood films: no parasites seen. Haemoglobin 60 per cent. Total leucocytes 15,200 per c.mm. Differential leucocyte count: eosinophiles 1 per cent.; polymorphonuclears 78 per cent.; small mononuclears 19 per cent.; large mononuclears 2 per cent.

The patient received two injections of novarsenobillon, which effected a rapid cure.

CASE 13.

Name—S. L., Hindu male, age 40 years.



Spirillum minus 15 days later. The rash spot on the dorsum of the hand was pricked in three or four places with a sharp needle and about ¼ c.c. of the exuding blood and serum, mixed with an equal volume of citrated saline, was inoculated into a white mouse intraperitoneally. This mouse showed *Spirillum minus* in its blood ten days later. The patient's serum was also tested against a

Case 13 (1928).—S. L., Hindu male, aged about 40, was bitten at night by a rat on the third toe of the left foot. The wound healed up, but 13 days later he had a high rise of temperature with rigor, and came to hospital on the 15th day, when fever was still present. He was admitted on the 7th June, 1928.

On admission the site of the bite was found to be red and swollen and extremely painful; the inguinal glands were enlarged and tender. Serous exudate was obtained from the oedematous area around the site of the bite and showed *Spirillum minus* when examined under dark ground illumination.

The subsequent course of the fever and treatment were as shown in the temperature chart. The other laboratory findings were as follows:—

8th June.—Thin and thick blood films for malaria: no parasites seen.

8th June.—Urine clear, no albumin, no casts, no sugar.

9th June.—Wassermann reaction: negative.

11th June.—Serum test for immobilization of standard laboratory strain of *Spirillum minus*: negative, no immobilization occurred.

Case 14 (1928).—M. K., Mahomedan male, aged 32. The patient was bitten at night by a rat on the right foot. There was a good deal of hæmorrhage from the site of the bite. The wound healed up, but on the 6th day it became red and inflamed and exquisitely tender, whilst high fever set in. He was first seen on the 14th June, 1928, the 15th day after having been bitten. He was admitted to hospital, and is still in hospital at the time of writing. The laboratory findings to date were as follows:—

14th June.—Serous exudate from the site of the bite shows *Spirillum minus* present. Night blood for filaria: negative.

15th June.—Stool shows no helminthic ova, protozoa or pathogenic bacteria.

16th June.—Wassermann reaction: negative.

Case 15 (1928).—K. K. D., Hindu female, aged about 55 years; was bitten on the left shoulder about a month before she came under observation. The wound healed up, but three weeks later a very painful swelling developed at the site of the bite, also fever. She consulted a doctor, who cauterised the area (probably with fuming nitric acid).

When first seen—25th June, 1928—there was a big spherical ulcer about 2 inches in diameter on the shoulder, with raised margins, covered by a black necrotic slough. The glands of the axillæ and neck were enlarged and very tender. There was a profuse rash, which was most pronounced on the thighs, mammae, and forearms, where it was rather of an urticarial character. Pain was present in most of the joints, and diarrhoea was also a feature of the case. The patient was admitted to hospital the same day, and is still in hospital at the time of writing this report.

The laboratory findings in this case were as follows:—

25th June.—Serous exudate from a rash area examined under the dark ground: no spirilla found. (The site of the bite itself was not examined, as it was covered by a large black slough.)

26th June.—Patient's blood inoculated into two mice. These showed *Spirillum minus* 9 days later.

With the exception of Nos. 1, 2, 3 and 6, the above cases were treated in the Carmichael Hospital for Tropical Diseases, attached to the Calcutta School of Tropical Medicine. The next three cases to be described were under the treatment of Dr. S. P. Bhattacharjee, M.N. (Cal.), Assistant Professor of Tropical Medicine at the School, and the junior author was called in, in consultation in connection with them. We are much indebted to Dr. Bhattacharjee for his kind permission to publish the notes on these cases.

minus nine days later. The patient was now treated with novarsenobillon, as shown on the chart, and recovered.

The interesting feature in this case is the very trivial character of the initial lesion, also the somewhat erratic character of the temperature chart.

Case 17.—This case was the most prolonged one that we have yet seen, and the patient did not become finally afebrile until the 128th day of illness.

Mr. N., Indian Christian, aged 65, was bitten at night by a rat on the right foot. He was sleeping on the second floor of a house in Calcutta. Mrs. N., who was sleeping in the same room, was also bitten by the same rat at the same time, but subsequently showed no symptoms. Mr. N. was bitten just before Mrs. N.

The local sore healed up promptly, but on the 17th day inflammation set in at the site of the bite, the right inguinal glands became enlarged and tender, and high fever set in with rigor. The patient complained of intense pain in all the muscles of the extremities.

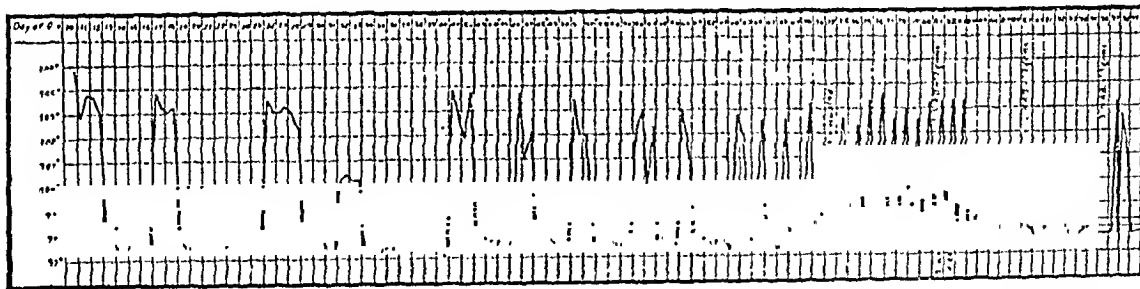
The subsequent course of the fever was as shown in the temperature chart. Between the 21st and 61st days of illness, nine injections of sulfarsenol were given subcutaneously, without in any way influencing the temperature. The fever ran a perfectly typical course, the pyrexial intervals being about three days each time, and the apyrexial periods four to five days; the chart in fact might serve very well as a standard chart of the course of the fever in rat-bite disease.

The patient now passed into the hands of the kavaraj on the 63rd day, but still continued to record his temperature. On the 77th day the patient was again seen by Dr. Bhattacharjee, who called in the junior author in consultation. Two guinea-pigs were inoculated with the patient's blood and both showed *Spirillum minus* eleven days later. In the meantime the patient had been put on to stovarsol and had gone to the hills for a change. This, however, did not check the fever, which continued as systematically as ever.

By the 82nd day the patient was in a pitiable condition. He was completely prostrated and very much emaciated.

CASE 16.

Name—Miss M., Anglo-Indian, age 8 years.



Case 16.—Miss M., Anglo-Indian, aged 8. This patient came for treatment for fever and swelling of the left inguinal glands. She mentioned that ten days previously she had had a slight scratch on the left great toe, while in bed at night which she attributed to a cockroach-bite, and of which she had taken no notice. There had been no local sore or tenderness. The case was taken to be one of filariasis—a disease which is very prevalent among the Anglo-Indian community in Calcutta—and she was treated with a mixed staphylococcus-streptococcus vaccine, then given a course of soamin injections, and then cytoselum.

The temperature chart in the meantime had assumed the form shown. Malaria being suspected, quinine was given, but had no effect on the fever. The temperature chart being very suspicious, and with the history of a previous "scratch" ten days before the onset of the fever, the suspicion of rat-bite fever now arose, and the junior author was called in. Blood was taken from the patient on the 72nd day of illness and injected into a guinea-pig and a mouse, both of which showed *Spirillum*

There was marked wasting of the muscles of the extremities. Pain in the muscles of the extremities, indeed, was a marked feature of the case throughout. The anemia was very severe; the blood picture was: haemoglobin 35 per cent., R.B.Cs. 2,000,000 per c.mm., and total leucocytes 10,600 per c.mm.

On the 91st day the pulse became slow and irregular, at a rate of 45 to 55 to the minute, and the urine became scanty. Examination of the urine showed abundant albumin present and a few hyaline casts. The pulse continued to be slow and irregular, and the amount of urine passed diminished, though there was less albumin in it than previously.

Novarsenobillon treatment was commenced on the 90th day of illness. On account of the albuminuria and tendency to suppression of urine, however, it was necessary to go slow. The doses were given intravenously, and the course was as follows:—

90th day N.A.B. 0.2 gm.

91st day. Patient put on full doses of alkalis and glucose by the mouth.

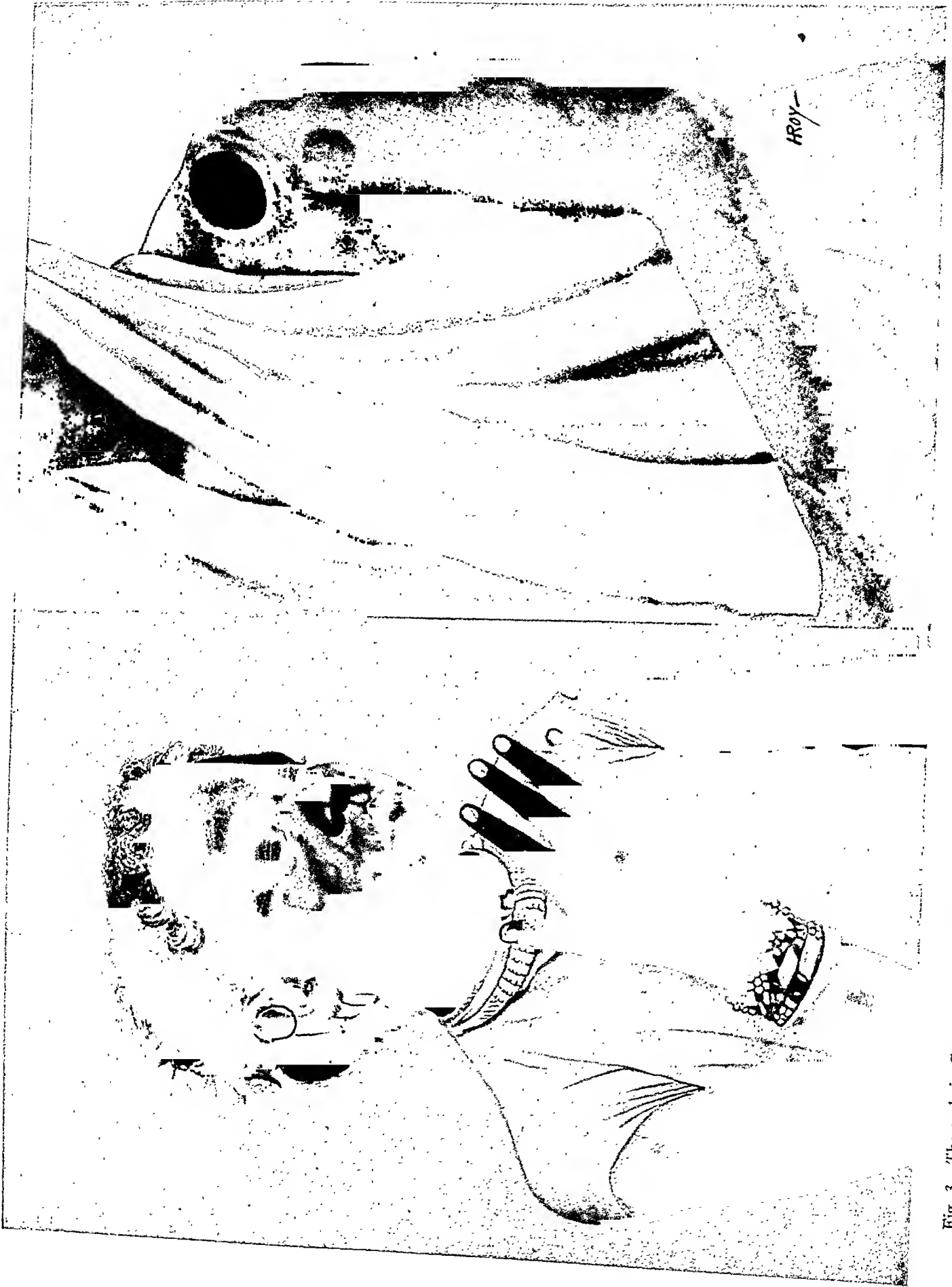
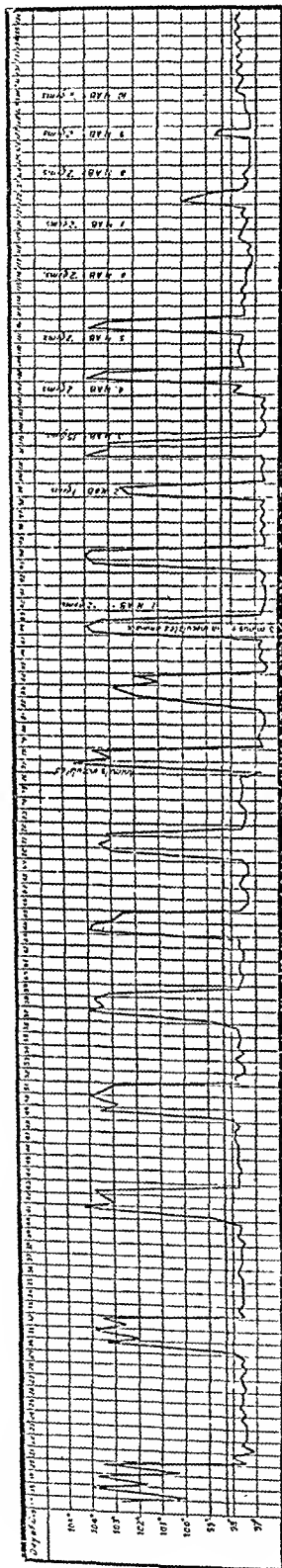


Fig. 3. The rash in Case 12; twentieth day after the bite. *S. minus* isolated in guinea-pig inoculated with the patient's blood. Patient's serum

Fig. 4. Case 15; bitten one month previously. The local lesion on the left shoulder was cauterised with nitric acid and an ulcer has formed

99th day. 0.1 grm.
103rd day. 0.15 grm.
107th day. 0.2 grm.
111th day. 0.2 grm.
116th day. 0.2 grm.

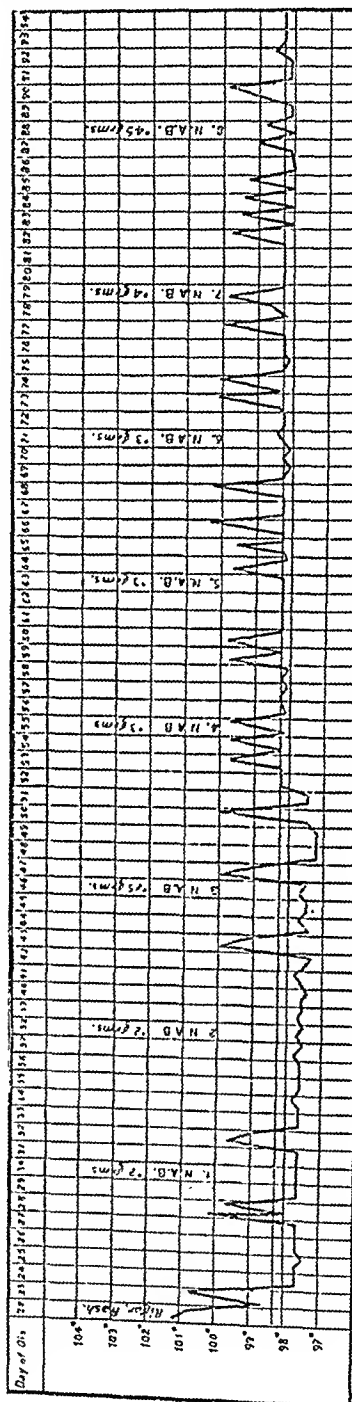
CASE 17.
Name—Mr. N., Indian Christian, age 65 years.



120th day. 0.2 grm.
124th day. 0.2 grm.
127th day. 0.2 grm.
130th day. 0.2 grm.
The temperature finally fell to normal on the 128th day, and the patient was by then well into convalescence.

The case is of interest from the severity of the symptoms, the long duration of the fever, the emaciation, the severe pains in the limbs, the failure of sulfarsenol and stovarsol, and the final cure with repeated small doses of novarsenobillon, administered cautiously.

CASE 18.
Name—Mrs. S.



Case 18.—Mrs. S., was bitten by a rat and subsequently had an ulcer at the site of the bite, with lymphangitis and lymphadenitis in the glands draining the site of the bite. With antiseptic dressings however the ulcer soon healed up.

Fever with rigor set in on the 22nd day after the bite, and an erythematous rash broke out on the affected extremity and on the front of the body. The subsequent course of the fever was as shown in the chart.

With the continuance of the fever rapidly progressive anaemia set in and general anasarca. On account of the latter it was necessary to proceed cautiously with the novarsenobillon treatment. The following blood examinations were carried out.

First week.—Hæmoglobin 80 per cent. R.B.Cs. 4,000,000 per c.mm. Total leucocytes 7,500 per c.mm.

Second week.—Hæmoglobin 60 per cent. R.B.Cs. 3,200,000 per c.mm. Total leucocytes 14,000 per c.mm.
Third week.—Hæmoglobin 40 per cent. R.B.Cs. 2,300,000 per c.mm. Total leucocytes 6,750 per c.mm.
Fourth week.—Hæmoglobin 25 per cent. R.B.Cs. 2,000,000 per c.mm. Total leucocytes 10,450 per c.mm.
 The Wassermann reaction gave completely negative results.

A guinea-pig was inoculated with the patient's blood (unfortunately at a time when she was afebrile.) No *Spirillum minus* could be found in this animal subsequently.

The course of treatment was as follows:—

30th day. N.A.B. 0.2 grm.
 38th day. N.A.B. 0.2 grm.
 45th day. N.A.B. 0.25 grm.
 55th day. N.A.B. 0.3 grm.
 62nd day. N.A.B. 0.3 grm.
 71st day. N.A.B. 0.3 grm.
 79th day. N.A.B. 0.4 grm.
 88th day. N.A.B. 0.45 grm.

On the 91st day the temperature fell to normal, and thereafter remained steadily normal.

96th day. N.A.B. 0.45 grm.

104th day. N.A.B. 0.45 grm.

The patient was now cured and in a generally satisfactory state of health.

OUTPATIENT CASES.

In addition to the above 18 cases, we have details of 10 further cases seen in the outpatient department. These were not admitted to hospital—usually because the patient refused to come into hospital, sometimes because no beds were available.

Case 19 (1924).—Chitra, a Hindu female child, aged 2 years, was bitten on the 4th February, 1924 on the forehead by an unknown animal. The child's mother was busy in an adjacent room at the time, but ran to the child on hearing her cry, stopped the bleeding by pressure with a cloth, and applied tincture of iodine. The wound healed up and the accident was forgotten. On the 25th day, however, fever set in. On examination the cervical, submaxillary, parotid and axillary glands were found to be enlarged and tender, and saliva was dribbling from the angles of the mouth. A dose of soamin had been administered by an outside practitioner. The liver was enlarged, and the patient had diarrhoea.

A mouse was inoculated with the patient's blood and showed *Spirillum minus* a week later. The child was seen a second time a week later, when the symptoms were to some extent ameliorated. When seen a third time there had again been fever with glandular enlargements. The parents refused to have the child taken into hospital.

Case 20 (1925).—P. D., Hindu male, aged 35, was referred to the Department from the Pasteur Institute, Calcutta. He had been bitten on the finger by a rat two weeks before. When first seen there was great swelling of the hand and forearm with much pain, and the axillary glands were also swollen and tender.

A mouse and a guinea-pig were inoculated. The mouse died the next day (owing to septic peritonitis from accidental wounding of the gut when giving the injection), but the guinea-pig's blood showed fairly numerous *Spirillum minus* ten days later. No beds being available, an alkaline mixture was prescribed and the patient told to return later.

He came back a month later and stated that during the interval he had had attacks of fever, each time with rigors. During the febrile attacks the site of the bite became red and tender. A week previously he stated that he had had a profuse rash on the face and chest, which had faded. Treatment with injections of novarsenobillon was advised, but the patient was not seen a third time.

Case 21 (1926).—Sudhamayee, a Hindu female child, aged 8, was bitten by some animal which was not identified on the right great toe on the night of the 8th July, 1926. On the 12th, swelling of the foot set

in with high fever. Next day vesicles appeared in the neighbourhood of the bite on the swollen area and she was brought to the outpatient department. The vesicles were punctured and stained films from the exudate examined, but no spirilla were seen; a few short chains of streptococci were present. No animal was inoculated at this stage, as the fever was thought to be due to sepsis. The swelling subsided soon afterwards on treating the part with baths of hot iodine lotion.

A week later, however, fever recurred and the child was again brought to the outpatient department. This time she looked very ill and complained of severe pain in all the limbs. The wound had completely healed, but there was pain and tenderness in the glands in the groin. Two young guinea-pigs were inoculated with the patient's blood and both showed *Spirillum minus* when examined on the tenth day.

The parents were advised to have the child treated by injections of sulfarsenol. The patient was not seen again.

Case 22 (1927).—N., a Mahomedan male, aged about 40, a tailor by profession, and resident in Kidderpore. The patient stated that he had been bitten by a mouse about six months before and that he had been getting fever off and on subsequently. Blood films were examined for malarial parasites, but none were found. Cinchona febrifuge was prescribed, and he was told to return when the fever recurred. A week later, he attended the laboratory, and at the time had high fever with rigor. Malaria was suspected and thin and thick blood films examined, but no parasites were found. A mouse was inoculated with the patient's blood and showed *Spirillum minus* on the 7th day.

The patient did not attend the department subsequently, though asked to do so.

Case 23 (1927).—Tegbahadin, male Gurkha, 28 years of age, was referred to the department from the Pasteur Institute, Calcutta, suffering from rat-bite. He stated that he had been bitten on the great toe by a rat seven days previously. The wound had healed, but œdema of the foot and leg had developed and the glands in the groin were swollen and tender. He had high fever when seen.

Blood films were taken and showed trophozoites and gametocytes of *Plasmodium vivax*. In view of the history, however, a mouse was inoculated to test for the possibility of a mixed infection, and showed *Spirillum minus* on the 9th day. At the time of his visit, cinchona febrifuge mixture was prescribed for the patient and he was instructed to return a week later, but failed to do so. (One wonders what happens to those untreated cases of rat-bite fever. Do they linger on and gradually die of the disease, or is the correct diagnosis made again in some other hospital and the patient properly treated?)

Case 24 (1927). This was a most unusual case, for the patient absolutely denied all history of a bite.

N. McG., Anglo-Indian male child, 5 years of age, the nephew of a member of the staff of the School, was suffering from fever in September 1927, with a temperature running between 102° and 103°F. His uncle took a blood film from the child, stained it, and asked the junior author of this paper to examine it for malaria parasites. No malaria parasites were seen, but—to his amazement—the junior author came across an undoubted *Spirillum minus* in the film. The film was seen by both authors and the organism was an undoubted *Spirillum minus*. The child was closely interrogated by his parents, but denied all history of a bite, nor could the parents remember that he had complained of having been bitten. He was thoroughly examined, but no scar of a bite could be found. He was treated with an alkaline mixture and made a spontaneous recovery; no quinine or arsenicals were given.

The slide on which the blood film was taken came from the Pathology Department of the School, where no work on *Spirillum minus* infection was going on at the time. It was stained in the Pathology Department, brought to the Protozoology Department, immediately put under the microscope and examined. These facts seem to exclude the possibility that the film had been

made on a slide on which a blood film from an inoculated animal might have been made previously.

Case 25 (1928). G. D., Hindu female, aged 28, came to the department on the 15th May, 1928, stating that she had been bitten at night on the left hand by a rat seventeen days previously. The wound healed up in three or four days' time, but a fortnight later the hand became red, swollen and very painful. With the onset of the local oedema, violent fever set in with rigors and vomiting. The left epitrochlear and axillary glands were tender and swollen, and there was a measles-like eruption present on the chest and arms.

The case was fairly thoroughly examined in the laboratory, and the laboratory findings were as follows:—

Thick and thin blood films: no malaria parasites or spirilla seen.

Direct examination of the blood under the dark ground: no parasites seen.

Half a c.c. of the patient's blood was inoculated intraperitoneally into a mouse: *Spirillum minus* was present in the mouse's blood on the 11th day.

Two c.c. of blood was inoculated intraperitoneally into a guinea-pig. This animal's blood was searched on the 15th day, but no spirilla found. It died on the night of the 16th to 17th day, but the body was too decomposed the next day to examine.

The urine was clear and showed no albumin. The centrifuged deposit showed no casts. The deposit was also examined under the dark ground, but no spirilla were detected.

Case 26 (1928).—I. S., Mahommedan adult male, aged about 50 years, a resident in Calcutta since birth, was bitten during his sleep at night on the right index finger. He woke up and saw the rat which had bitten him. There was only slight pain at the time, and the wound healed up in four or five days' time. On the 10th day after the bite the bitten area became red and painful and the wound broke down and suppurated. There was a streak of acute lymphangitis running up the arm and the glands in the axilla of the same side became tender to pressure. Fever did not set in, however, until five days after the re-appearance of local pain and swelling. (The patient denied all previous history of filariasis or lymphangitis, though he admitted to syphilis some twenty years previously and to gonorrhoea some fifteen years previously.)

When the fever set in, the temperature rose to 101°F., but without any rigor. Remittent continued fever persisted for four days, ranging between 99° and 101°F., the remissions being accompanied by sweating.

The patient was treated by a medical practitioner in Calcutta, who gave him two subcutaneous injections of sulfarsenol: one seven days before, and one three days before sending him to the laboratory for examination. He attended the laboratory on the 2nd June, 1928, the 20th day after the bite. The laboratory findings were as follows:—

Exudate from the local lesion examined under the dark ground: no spirilla seen.

Immobilization test: the patient's serum failed to immobilise a standard laboratory strain of *Spirillum minus* in 30 minutes.

A guinea-pig inoculated with the patient's blood on 2nd June, 1928, showed *Spirillum minus* in the blood on 15th June.

The patient was not seen again.

Case 27 (1928).—M. S., Hindu male, aged 28, was bitten by a rat on the inner side of the right arm a little above the elbow. The site of the bite healed up within a few days, but ten or twelve days after the bite the area became red, swollen and indurated. Fever set in on the 14th day after the bite and was present when the patient was seen, on the 20th day after the bite (6th June, 1928).

On examination, there was a big area of red, swollen induration about 5 inches long and 3 inches broad at the site of the bite, and the patient complained of excruciating pain in the arm and axilla. The axillary glands on the same side were much swollen and tender.

The laboratory findings in this case were as follows:—

Serum from the site of the bite showed *Spirillum minus* under the dark ground.

Two guinea-pigs inoculated with the patient's blood: both showed *Spirillum minus* in their blood on the 11th day.

Immobilization test: the patient's serum failed to immobilise a standard laboratory strain of *Spirillum minus* within 15 minutes.

Hæmoglobin: 90 per cent.

Total R.B.Cs.: 4,850,000 per c.mm.

Total leucocytes: 16,200 per c.mm.

Urine: a trace of albumin present, very numerous pus cells; no casts.

Thin and thick blood films: no parasites seen.

9th June. Wassermann reaction: complete negative.

Case 28 (1928).—Mr. D., Hindu male, aged 30 years, was bitten on the foot by a rat on the 30th March 1928, at night. Next morning he applied tincture of iodine and antiseptic dressings. The wound healed up completely in four or five days' time. Twenty days after the bite, however, severe pain, tenderness and swelling set in at the site of the bite, with enlargement and tenderness of the inguinal glands of the same side, pains in the limbs and joints, and fever attended with rigor.

Two days later he developed a rash on the forearm, elbow and leg.

The patient states that his mother was also bitten by a rat in the same house more than a month previously, but had shown no symptoms up to the end of June 1928.

The patient was seen as an outpatient on the 22nd June 1928, when the laboratory findings were as follows:—

Serous exudate from the site of the lesions examined under the dark ground: no spirilla seen.

Two mice inoculated intraperitoneally with the patient's blood: both showed *Spirillum minus* in their blood 10 days later.

The urine shows a trace of albumin, but no casts.

The case is still under observation at the time of writing this report.

In addition to the above 28 cases of rat-bite fever, we have seen several other cases—chiefly during the earlier years of work at the School, 1921-1924—of which unfortunately no detailed records have been kept. In all, we should think that we have seen at least 35, if not 40 cases of the disease during the last eight years. The disease therefore must be a relatively common one in India. It will be seen that it has been described from Bombay, Calcutta, Shillong, Goa, Central India and Colombo, and therefore must have a wide geographical distribution in this country.

Case 29.—One case in particular deserves mention, and occurred in 1926. It is mentioned on p. 55 of the Annual Report of the Calcutta School of Tropical Medicine and Hygiene for 1926. In this case, the blood of a white mouse inoculated with the blood of a patient suffering from rat-bite fever showed not only *Spirillum minus*, but also a streptothrix. On sub-passage of its blood into a second mouse, the *Spirillum minus* infection took, but not the streptothrix one. (Unfortunately no details were noted with regard to this patient).

Now Tunncliffe (1916, 1916a) has recorded a broncho-pneumonia in rats due to a streptothrix, and streptothrix infection in cases of rat-bite fever has been recorded by Schottmüller (1914), Blake (1916), Tiletson (1916), Litterer (1917), and Tunncliffe and Mayer (1918). Other observers have recorded secondary infections with septic cocci, bacilli and the like.

In our case, the streptothrix infection was clearly a secondary one, and the same is likely to be true of the other recorded cases. Secondary streptothrix infections of ulcers are not uncommon in the tropics, and we have seen such infection occurring in cases of inguinal granuloma and the like, so that possibly this contamination is air-borne. On the other hand, McDermott (1928) notes that in cases where a secondary streptothrix infection occurs, there is apparently almost always suppuration at the site of the bite; whereas in pure strain infections with *Spirillum minus* suppuration does not occur at the site of the bite. "It is not unreasonable to presume," he writes, "that a streptothrix or leptothrix infection may be transmitted to man by the bite of a rat. The further inference may also be drawn that in every case of intermittent fever following a rat-bite, the possibility of a streptothrix infection being present, either alone or with spirillosis, must be borne in mind, especially if salvarsan treatment is not proving satisfactory." He comments on the fact that in some of these cases it is distinctly mentioned that the rat was mangy or looked ill, and concludes that in such cases possibly the rat is infected with bronchopneumonia due to a streptothrix, and that its saliva is infected from the coughed-up sputum.

COMMENTS ON OUR SERIES OF CASES.

The case histories recorded above, we believe, are sufficiently numerous to give a clear clinical account of the chief features of rat-bite fever as seen in India, but there are a few special points on which we may here comment.

Diagnosis by inoculation of the blood into susceptible animals. In our experience, this is far and away the most certain method of diagnosis. The white mouse is definitely more susceptible to infection than the guinea-pig, and young guinea-pigs more susceptible than older ones. Row (1922) mentions that he had failed to isolate the spirillum by this method in any of his patients. On the other hand, we have but rarely failed to do so, provided the blood is taken at a time when the patient has fever. In our series of cases the following gave negative results on inoculation of the patient's blood into susceptible animals:—Nos. 9, 10 and 18—the last of whom was afebrile at the time when the blood was taken. Three in all. The following gave positive results on animal inoculation:—Nos. 2, 3, 4, 5, 6, 7, 8, 11, 12, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29. Twenty-four in all.

The technique for this method will be described later.

Diagnosis by examination of serous exudate from the local lesion. This is regarded by Row as the best method of establishing the diagnosis. Powell and Bana's case was also diagnosed by this method, whilst Row and Parmanand both infected their animals by inoculation of expressed

fluid from the local lesion. McDermott* infected his guinea-pigs by inoculation with an emulsion prepared from the excised inflamed lymphatic glands.

In our earlier cases we had very little success with this method, but this was probably due to faulty technique, for we prepared, stained, and examined thin films from the serous exudate. Thus we failed to find spirilla in serous exudate from the local lesions in Cases 2, 4, 15 (from the rash), 26 and 28. Cases 13, 14, and 27 however yielded positive findings. On the other hand, we have lately realised that our earlier technique was faulty, and that the best method of examining the serous exudate is to examine it in the fresh state under the dark ground.

We have examined thin and thick films of the peripheral blood of most of the patients, but in only one—Case 24—have we seen the spirillum in such films. Examination of stained thin or thick films of the patient's blood appears to be a waste of time. On the other hand, it may be necessary, to exclude malaria. In Case 23 a mixed infection of rat-bite fever and benign tertian malaria was present.

McDermott lays stress on the value of the immobilization test with the patient's serum. The technique for this test will be described later, but we regard it as of value only when a positive result is obtained. The serum of patient No. 12 immobilised a standard laboratory strain of *Spirillum minus* within 15 minutes, but the test gave negative results in Cases 13, 26 and 27.

McDermott considers that "if syphilis can be excluded, a positive Wassermann reaction would be significant," whilst Briggs clearly regards the positive Wassermann reaction in his case as being due to rat-bite fever and not to syphilis. He does not state the laboratory in which this test was carried out, unfortunately. Surveyor records a negative Wassermann reaction in his patient, and Row remarks that his patients gave negative Wassermann reactions. The Wassermann reaction was tested in seven of our cases by the Imperial Serologist to the Government of India, Lieut.-Col. R. B. Lloyd, I.M.S., to whom we are very much indebted for carrying out these tests. It was completely negative in Cases 3, 12, 13, 14, 18 and 27; doubtful in Case 4; moderately positive in Case 5—a Mahomedan cook—and Case 9—a Hindu female, aged 60. Previous syphilis cannot always be ruled out, and in no case was the reaction strongly positive. We doubt very much whether the Wassermann test has any diagnostic value with regard to rat-bite fever, but further investigation of this point is wanted.

McDermott writes that "in mild cases there may be no involvement of the kidney, but in cases of any severity a toxic nephritis is common, the urine being diminished in amount and containing albumin and casts." This is well

*The references given throughout this paper to McDermott refer to his 1928 paper.

exemplified in our series in Cases 6 and 17; in Cases 27 and 28 a trace of albumin was present, but no casts; in Cases 4, 5, 10, 12, 13 and 25, however, the urine was perfectly clear and free from albumin and casts.

In estimating the incubation period of the disease, up to the time of onset of the high fever and local oedema and inflammation of the site of the bite, we have had to rely chiefly on the patient's own statements, but the following figures may be quoted:—

Case 1. 14 days.	Case 15. 21 days.
Case 2. 12 days.	Case 16. 10 days.
Case 3. (Febrile at the time when bitten.)	Case 17. 17 days.
Case 4. 16 days.	Case 18. 22 days.
Case 5. 10 days.	Case 19. 25 days.
Case 6. 15 days.	Case 20. (Uncertain).
Case 7. 7 days.	Case 21. 4 days. (A young child).
Case 8. 10 days.	Case 22. (Uncertain).
Case 9. (Uncertain).	Case 23. 7 days.
Case 10. 15 days.	Case 24. (Denied all history of bite).
Case 11. 12 days.	Case 25. 14 days.
Case 12. (Uncertain).	Case 26. 10 days.
Case 13. 13 days.	Case 27. 11 days.
Case 14. 6 days.	Case 28. 20 days.

This which gives an average incubation period of 13.2 days. The actual figures, however, are very variable.

In some cases of rat-bite fever, the initial lesion may be of the most trivial description. This is well exemplified by Case 16, where the patient attributed the bite to a cockroach; whilst Case 24 denied all history of any bite at all. McDermott quotes an extraordinary case recorded by Boidin (1922) where the infection was acquired by eating a raw rat; also others in which "transmission was probably due to mechanical transfer." The disease has also been transmitted by the bite and even by a scratch from the claws of an infected cat; also by weasels and ferrets; and in one case by the bite of a dog.

In only three cases in our series—Nos. 13, 14 and 27—was the diagnosis established by finding the spirillum in the serous exudate from the local lesion. We believe, however, that we have not paid sufficient attention to this method of diagnosis, and hope to pay more attention to it in the future.

The severe and progressive anæmia of rat-bite fever is well illustrated by Cases 17 and 18.

THE DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF RAT-BITE FEVER.

The diagnosis of rat-bite fever is usually quite straightforward. There is a definite history of a bite (usually at night), either by a rat or some animal which has not been seen. The temperature chart is very characteristic, so also is the acute local oedema, induration and pain at the site of the lesion (which has usually healed up). Headache, vertigo, and sometimes vomiting accompany the onset of fever, which usually takes place with rigor. Acute pains in the limbs are complained of. A rash may or may not be present, and may be easily overlooked in dark-skinned patients. The lymphadenitis is usually

marked, and may affect only the glands draining the site of the bite or may be generalised.

Laboratory Diagnosis. In order to confirm the diagnosis, the following procedures may be resorted to in the laboratory:—

(i) *Examination of the Local Lesion.* A prick is made with a sharp stout needle into the oedematous area around the site of the bite, and the fluid that oozes out is examined under dark ground illumination. The movements of the spirillum at first are extremely active; it flashes across the field like a streak of light. After the preparation has been put up for some little time, however, the movements slow down and the spirilla become clearly visible. The preparation should therefore be vaselined and allowed to settle for some little time before it is examined.

In the absence of dark ground illumination, films may be stained for diagnostic purposes by either Leishman's or Giemsa's stain. The best method of demonstrating *Spirillum minus*, however, and the one which brings out the terminal flagella best—in our experience—is Tribondeau's modification of Fontana's stain. For the sake of completeness we may here give details of this method.

(1) Prepare a thin film of the clear serous exudate from the lesion on a slide. Allow it to dry in air.

(2) Lay the slide on a staining rack and flood the dry film with Ruge's solution, which has the following composition:—

Pure glacial acetic acid	..	..	1 c.c.
Formalin (40 per cent.)	..	..	2 c.c.
Distilled water	..	..	100 c.c.

Pour the fixative on, drain off, and repeat two or three times for about a minute.

(3) Drain the fixative off the slide. Cover the slide with methyl alcohol and flame by applying a lighted match to the slide. This completes fixation.

(4) Lay the slide on the staining rack, and flood with the following mordant:—

Fresh tannic acid, powder	..	5 grammes.
Distilled water	..	100 c.c.

Warm gently till steam rises from the slide. The best and least messy way of doing this is to wrap a little cotton-wool round the end of a piece of wire, soak it in spirit, light it, and hold it under the slide. When steam rises from the slide, remove the flame and allow the mordant to act for 30 seconds longer, without further heating.

(5) Wash the slide with distilled water and then cover it with Fontana's silver solution. To prepare this, a 5 per cent. aqueous solution of silver nitrate is taken in a glass cylinder which has previously been very thoroughly washed with distilled water. With a capillary pipette add liquor ammoniæ fortis B.P. drop by drop. A sepia precipitate forms and then re-dissolves. To the now clear solution add more liquor ammoniæ fortis *very carefully*, and only drop by drop from a capillary pipette, until a solution results which is just opalescent (and no more) on shaking. Do not add a drop more of the ammonia solution than is necessary to produce slight opalescence.

Cover the slide with this solution and warm gently till steam arises, then remove the flame and allow the warm solution to act for a further 30 seconds.

(6) Wash the film in distilled water, and allow to dry in air. It should never be blotted.

Examine with the oil-immersion lens. The spirilla stain an intense brown-black against a faint yellow background. The appearance of

the spirillum by this method is illustrated in the text figure. Fontana-stained films fade very rapidly and permanent preparations cannot be obtained by this method. The tannic acid used must be fresh; old solutions of tannic acid which have been exposed to light are useless, and are also very apt to become contaminated with moulds.

The spirillum can also be stained with Leishman's stain or by prolonged staining with Giemsa's stain, but, in our experience, Fontana's stain is preferable to either of these methods and brings out the fine terminal flagellum of *Spirillum minus* with considerable constancy and clear definition. Several workers such as Wenyon (1926, p. 1286) and McDermott (1928) figure spirilla with more than one terminal flagellum at each end, but so far we have never seen more than one terminal flagellum at each end.

The number of spirilla in a film from the serous exudate is usually scanty and prolonged search may have to be made. On the other hand, it seems probable that this method is the one that is most likely to give immediate confirmation of the clinical diagnosis.

(ii) *Immobilization Test with the Patient's Serum.* For this test a guinea-pig or mouse previously infected with a standard strain of *Spirillum minus* is required.

The patient's serum is diluted 1:5 with normal saline, and one volume of the diluted serum mixed with an equal volume of the blood of the infected mouse or guinea-pig on a slide. A cover-slip is applied, and the preparation is vased and allowed to stand for one hour. It is then examined under the dark ground microscope. It is essential in all cases to put up a control preparation with normal serum from a person who has not been bitten. In the control preparation the spirilla are still actively motile at the end of an hour, in the patient's serum, if the result is positive, the spirilla are completely immobile at the end of one hour (or sometimes sooner).

The test is of value in diagnosis only if the result is positive. A positive result indicates that the patient is infected with *Spirillum minus*. On the other hand, in three of our cases in which the test gave negative results, *Spirillum minus* was demonstrated on inoculation of the blood into susceptible animals.

(iii) *Inoculation of Susceptible Animals.* In our experience this is the most certain and reliable method of demonstrating that the patient is infected with *Spirillum minus*. It succeeded in 23 out of the 26 cases in which we tried it. The blood however must be taken during the febrile period.

The most susceptible animals are in order of frequency:—(i) White mice—of which we used an English strain, imported in connection with kala-azar work at the School; (ii) young guinea-pigs; and (iii) adult guinea-pigs. McDermott found 13 out of 14 white rats susceptible, also rabbits and the *Macacus rhesus* monkey. The

animals can either be inoculated subcutaneously with a drop of serous exudate from the lesion, as has been successfully done by Row, Parmanand, McDermott, and others, or, as in our series, intraperitoneally with the patient's blood. The technique for the latter operation is as follows:—

At a time when the patient has fever 3 c.c. of blood is withdrawn from the median basilic vein with a hypodermic syringe and immediately inoculated into two animals: 2 c.c. being given intraperitoneally to a guinea-pig and $\frac{1}{2}$ c.c. intraperitoneally to a white mouse. The blood of these animals is then examined daily from the 8th day onwards under the dark ground microscope. A small drop of blood is obtained, either by snipping the nail of the guinea-pig with a fine sharp pair of scissors or snipping off the end of the tail of the mouse, and placed on a thin, perfectly clean slide, which should not be more than 1.2 mm. thick. A very thin and scrupulously clean cover-slip is then dropped on it, and the preparation vaselined. The preparation should be so thin that the red corpuscles do not overlap one another. It should be examined under the dark ground about half an hour after it has been made, by which time the spirilla have slowed down to some extent and their detection become easier.

It is very important not to mistake pseudo-spirochaetes, i.e., filaments from disintegrating red corpuscles, and hæmoconia particles for sluggish spirilla.

In the absence of the dark ground, blood films can be taken from the inoculated animals and stained with Fontana's stain, or with Leishman's or Giemsa's stain, or by the panoptic method. The spirilla, as a rule, are not numerous in the film, and it may have to be searched for some little time before they are found. Once seen, however, the laboratory worker can never fail to identify *Spirillum minus* again. Under the dark ground the spirillum appears as a very actively motile refractile wavy organism. It stains readily by any aniline dye, and also by Leishman's and Giemsa's stains. With Fontana's stain it shows up very prominently, the deposit of silver causing it to appear thicker and coarser than it really is, and the terminal flagella usually stain well by this method. Non-dividing forms measure from 1.5 μ to 10 μ (exclusive of the terminal flagellum), and each wave is about 1 μ in length.

Spirillum minus is a spirillum with a rigid structure. Whereas in a true spirochaete the coils are formed by the bending of the organism as it travels, the coils in *Spirillum minus* are pre-formed and the organism has a rigid structure, like that of a corkscrew. McDermott quotes Ruys (1926) as stating that the windings lie in one plane. The waves are very regular, and in a blood film the spirilla are frequently seen applied either by one end or along their length to the margin of a red blood corpuscle. (This may be an effect due to spreading, but it is rather a characteristic appearance of this spirillum).

Movement is rapid and in a straight line, as a rule. The ends of the spirillum may be blunt, but are usually sharply pointed, especially as seen in Fontana-stained preparations. There is not the lateral bending movements so characteristic of the true spirochaetes. Motility is retained in sealed blood preparations for several hours. Division appears to be always by transverse binary fission.

McDermott states that there may be from 1 to 7 flagella at each end of the spirillum, and advocates Adachi's method for demonstrating them. We have not tried this method, but have found Tribondeau's modification of Fontana's stain very reliable.

During the past five years we have made repeated attempts to cultivate *Spirillum minus* *in vitro*, using very many different methods, but have never once succeeded. Futaki and his colleagues (1917) claim to have cultivated this organism *in vitro*. Joekes (1925) also claims to have been successful. On the other hand, a most curious feature of Joekes' cultures was that all successful cultures contained a symbiotic coliform bacillus, from which he found it impossible to separate the spirillum. This sounds very suspicious. Noguchi (1928, Plate X) has recently drawn attention to the liability of mistaking detached bacillary flagella in a culture-medium for spirochaetes, and this may explain Joekes' findings. Our complete failure to cultivate *Spirillum minus in vitro* is in accordance with the equally complete failure of Robertson (1924) and McDermott (1928).

In practically every instance man is infected by the bite of an infective rat, and the exact mechanism has been much discussed. The spirillum has never so far been demonstrated in the saliva of infected rats, though McDermott considers that it may only have to be looked for further to be found. The rat occasionally bites sufficiently hard to break a tooth, and it is usually supposed that the spirilla escape from the blood through some lesion of the gums of the rat into the saliva at the moment of biting. McDermott notes the presence of keratitis with a profuse discharge from the eyes and nostrils, in which the spirillum may be present; spirilla from this source could easily come to contaminate the site of the bite when the rat bit. McDermott further draws attention to the general resemblance of rat-bite fever to syphilis. There is a primary lesion in both diseases: a secondary eruption, and tertiary lesions. The tertiary lesions in an infected rat take the form of white nodules in the lungs, which, on section are found to consist of necrotic matter, encapsuled by fibrosis. The presence of spirilla in these lesions was demonstrated by inoculating the matter into guinea-pigs, which became positive. These tertiary lesions may ulcerate into the bronchi; the infected sputum be coughed up, and so come to contaminate the rat's saliva. "These tertiary lesions," writes McDermott, "offer an easy explanation of the entry of spirilla into the bite wound: by secre-

tion from the eyes (or, in the cat at least, from the nose) streaming down the muzzle on to the wound or into the buccal cavity by way of the nose and naso-palatine duct, or by the passage of material from ulcerated lesions into the mouth the 'sick' appearance of rats in the tertiary stage of the experimental disease suggests that many of the infectious rats may have been in this stage of the disease, and that accordingly the usual mode of infection is by contamination of the wound with material from the eyes (or nose) or from internal granulomatous lesions."

Transmission of the infection from rat to rat presumably takes place by bites. It is also clear that it might occur by coitus if the mucosa of the genitalia were abraded. Dr. B. C. Basu, Entomologist to the Spirochaetosis Transmission Enquiry in our Department, under the Indian Research Fund Association has fed rat fleas on infected mice and guinea-pigs. He finds that *Spirillum minus* will survive in the gut of fed fleas for 24 hours or even longer. On the other hand, he could find no evidence of invasion of the coelomic cavity or of the salivary glands of the flea. It does not appear likely that fleas play any part in the transmission of the disease in Nature.

DIFFERENTIAL DIAGNOSIS.

Although the diagnosis of rat-bite fever is usually straightforward enough, yet in our experience of the disease it may occasionally present unexpected difficulties. The diseases which may be confused with true rat-bite fever due to *Spirillum minus* are chiefly as follows:—

(i) *Simple Septic Fever following after a Rat-bite.* Here there will be suppuration at the site of the wound, marked polymorphonuclear leucocytosis (to a much greater degree than is the case in true rat-bite fever), and an entirely different type of temperature chart. At first, however, we did not realise how often septic infection may be super-imposed on true rat-bite fever. Case 3 is a good example in point. The appearances of the lesion were very septic, the temperature chart very aberrant (at first), and simple septic fever was suspected. On the other hand, both the inoculated mouse and guinea-pig showed *Spirillum minus*. This case taught us the very necessary lesson that the presence of sepsis and an aberrant temperature chart may not exclude infection with *Spirillum minus* (though it renders any hope of finding the spirillum in exudate from the site of the lesion hopeless).

(ii) *Filariasis, and especially Filarial Lymphangitis.* Filarial infection is very common in Calcutta city, some 12 per cent. of the population being infected. It is especially prevalent in the Anglo-Indian community and among Indian clerks, artisans, and even in the professional classes. Hence rat-bite fever may be mistaken for filarial fever, and the acute swelling and oedema of the site of the bite be confused

with for filarial lymphangitis. The bite may have been forgotten, or it may have been so trivial as to have been overlooked. Cases 16 and 24 are instances in point. In Case 11 both infections were present simultaneously. Examination of the blood at night will usually disclose micro-filariae in cases of filarial fever, but in established filarial lymphangitis micro-filariae are frequently not found. The eosinophilia of filariasis is in marked contrast to the tendency for the eosinophile count to be low in rat-bite fever.

(iii) *Relapsing Fever*.—In areas in India where relapsing fever is prevalent, together with rat-bite fever, confusion may arise. The febrile period in rat-bite fever, however, rarely exceeds 48 hours, whereas in Indian relapsing fever it is usually five or six days. Examination of a fresh drop of blood taken from the patient during the febrile phase usually fails to show any spirilla in cases of rat-bite fever, whereas usually very numerous *Spirocheta recurrentis* are found in cases of relapsing fever.

(iv) The onset of the fever with acute malaise, headache, joint pains, and sometimes vomiting, and the desquescence with sweating may simulate malaria, though the temperature in rat-bite fever is usually elevated for a longer period than in malaria. Differentiation is readily established by examining a stained blood film. The two diseases may co-exist in the same patient (Case 23).

(v) It is possible that a case of rat-bite fever might be mistaken for one of dengue, during a dengue epidemic. The local lesion in rat-bite fever, and the entirely different types of temperature charts in the two diseases should serve to establish the differential diagnosis.

(vi) The acutely painful brawny red oedema at the site of the bite in rat-bite fever rather resembles the local condition present in erysipelas. On the other hand, in rat-bite fever there is no defined advancing margin to the area of acute inflammation; the leucocytosis is markedly greater in erysipelas; and the temperature chart will not show the periodic relapses of rat-bite fever.

TREATMENT.

The treatment of rat-bite fever is simplicity itself. One or two intravenous injections of novarsenobillon are frequently sufficient to cure the case (e.g., Case 9; also Briggs' (1922) case). On the other hand, it is advisable to give a second and even a third injection, in order to make sure that the infection has been eradicated. Sulfarsenol seems less effective than novarsenobillon (e.g., Case 17). Where there is much albumin in the urine, it is advisable to go slow and trust to repeated injections of small doses, rather than to two or three larger doses (e.g., Case 17).

The local inflammation and pain may call for hot fomentations, but with the destruction of the spirilla by novarsenobillon, the local symptoms clear up almost as rapidly as does the fever.

THE DISEASE IN EXPERIMENTAL ANIMALS.

McDermott gives a very thorough account of the disease as seen in inoculated mice, rats, guinea-pigs, rabbits, monkeys, cats and ferrets, so we need here give only some general observations on this subject. We have used animals chiefly for purposes of diagnosis, and during the last four years have inoculated 26 guinea-pigs and about the same number of white mice.

Guinea-pigs.—Twenty-six guinea-pigs were inoculated intraperitoneally, each with 2 c.c. of blood from the patient. Of these 26 guinea-pigs, 23 subsequently showed *Spirillum minus* in their blood, though one was not positive until the 38th day after inoculation. Two remained negative for more than two months after inoculation, after which period they were not further examined. On the other hand, in both these instances the mice inoculated from the same patients took. McDermott (p. 449) states that the reaction of guinea-pigs varies: some dying without ever having shown spirilla, others remaining negative. This is not our experience. Further, on sub-passage from guinea-pig to guinea-pig, the infection is invariably successfully transmitted, and a standard laboratory strain can be maintained very easily. In the case of guinea-pigs primarily inoculated with the patient's blood, spirilla may appear as early as the 8th day or as late as the 38th day, usually towards the end of the second week. In sub-passage animals spirilla usually appear in the blood on the 7th day.

The principal symptoms in the infected guinea-pigs are:—

- (i) Loss of weight.
- (ii) Marked emaciation.
- (iii) Thinning of the fur, especially on the front of the chest and abdomen.
- (iv) Oedema of the legs, leading to ulceration. A fairly large number of spirilla can be seen in the discharge from these ulcers.
- (v) Fever: the temperature rising to 102° to 104° F. or more.
- (vi) Blepharitis—a symptom which is not, however, invariably present.

The infected guinea-pigs usually die about two months after inoculation.

White Mice.—Spirilla appear earlier in inoculated mice than in inoculated guinea-pigs. The inoculated mice generally die within a month after inoculation, but it is difficult to say whether death is due to spirillosis or to other intercurrent infections. In one instance a mouse inoculated on the 22nd February, 1927, remained quite healthy until it was chloroformed on July 7th, 1927. At autopsy the spleen was found to be enormously enlarged, and smeared from this organ and from the kidney showed scanty spirilla.

Mice do not seem to suffer from any symptoms when infected with *Spirillum minus*. The same point has been noted by McDermott. The

spirilla are not constantly present in the blood of infected mice; they appear, disappear, and reappear. At autopsy on infected mice a lesser or greater degree of splenic enlargement seems to be invariably present, and sometimes the spleen may be three or four times its normal size.

White Rats.—Two white rats were inoculated with the blood of an infected guinea-pig on the 24th May, 1928. Their blood was examined daily from the 9th day onwards, but did not become positive till the 30th June, 1928, when both showed scanty spirilla in their blood—an interval of 37 days.

Spirillum minus IN ITS NATURAL HOSTS.

Prior to 1928, our method of examination of rats for *Spirillum minus* and for *Trypanosoma lewisi* was to take thin blood films, stain them and examine them. More than 100 rats have been so examined from different areas in Calcutta during the last few years. One rat showed a mixed infection with both *Trypanosoma* and *Spirillum minus*. Two further rats, both of them caught at Kidderpore docks, showed *Spirillum minus* infection.

This year (1928), however, we have taken to examining the blood of rats by dark ground illumination. Twenty-three rats (all *Rattus norvegicus*) were thus examined. Results were as follows:—

	No. examined.	No positive for <i>Spirillum</i> <i>minus</i> .
From Kidderpore ..	7	3
From Princep Street area.	6	1
From sweepers' quarters at the Medi- cal College.	8	0
From Belgatchia ..	2	1
TOTAL ..	23	5

This table shows the great superiority of the dark ground method of examination to simple examination of a stained blood film. It also shows how heavy is the percentage of infection with *Spirillum minus* in rats in certain areas of Calcutta city—especially the area around Kidderpore docks.

It is this fact that explains why rat-bite fever is a relatively frequent disease in Calcutta.

SUMMARY.

(1) We believe rat-bite fever to be quite a common disease in India. It is very prevalent in Calcutta, and some 30 to 35 cases have been seen by the authors during the last five years.

(2) Details are given in the present paper of 28 cases especially studied by laboratory methods; also a review of the previous literature on the disease as it occurs in India. Clinically these cases are typical of the disease as seen in other countries.

(3) The diagnosis is usually a straightforward matter, but the initial lesion may occasionally be of a trivial character and this may lead to confusion with filariasis, filarial lymphangitis, relapsing fever, malaria, and erysipelas.

(4) In the laboratory the best methods of establishing the diagnosis are (a) examination of the serous exudate from the local lesion under the dark ground microscope, and (b) inoculation of the patient's blood into white mice and guinea-pigs. The latter method was successful in our hands in 23 out of 26 cases in which it was tried.

(5) A description is given of the disease as it occurs in laboratory animals, and of the methods of examining them. Again, examination of the blood under the dark ground microscope gives much better results than the examination of stained thin blood films.

(6) The morphology of *Spirillum minus* is discussed. Tribondeau's modification of Fontana's stain is recommended for bringing out the terminal flagella of this organism.

(7) An examination of rats in Calcutta city (of species *Rattus norvegicus*) shows that a considerable proportion of them (5 out of 23 examined by the dark ground method) are infected, especially in the Kidderpore docks area.

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ON ETHER BY THE OPEN METHOD AS THE ANÆSTHETIC OF CHOICE IN INDIAN CONDITIONS.

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THE superiority of ether administered by the "open" method over chloroform or "mixtures" as an anæsthetic in temperate climates is unchallenged; but conversation with many sceptical colleagues has convinced one of the writers that its cause needs pleading with surgeons in the Indian *mofussil*. The writers have no experience of conditions prevailing in the large hospitals of the Presidency towns; and if surgeons there employed are inclined to retort that Queen Anne is dead, they can only agree; but they plead in extenuation that the fact does not seem to enjoy general acceptance in the *mofussil*.

For over ten years one of the writers has insisted on the administration of open ether in every case where it was practicable and not contraindicated by the nature of the operation to be performed, and in climates varying from the Persian Plateau at 6,000 ft. elevation to the plains of the Derajat and Rajputana; and for a similar period he has enthusiastically championed its cause in conversation with the sceptical colleagues referred to, with more or less success. Objections to it have been raised on the score of expense, on the score of technical difficulties, and on the score that at high temperatures evaporation is so rapid that induction of anæsthesia is impossible.

The writers, on the other hand, claim that induction is not only possible but regularly practised, that the technical difficulties are very much fewer than those which attend the administration of chloroform, and that the very much greater margin of safety more than overrules the extra expense, if any. At the risk of being accused of vain repetition they would emphasise the obvious advantages of an anæsthetic which in physiological doses is a cardiac and respiratory stimulant instead of a depressant, which is associated with no delayed poisoning and which produces, relatively speaking, no ketosis. An additional advantage from the surgeon's point of view, is the greatly superior muscular relaxation obtainable on deep anæsthesia, while from the anæsthetist's side there is the possibility of accommodating the surgeon without risk to his patient, which the margin of safety in ether provides.

In order to substantiate their contention they kept careful records over a period of time extending from 17th November, 1926 to 28th August, 1927 of all operations performed under open ether anæsthesia.

These observations were designed so as to include both the cold weather and the hot weather and thus provide a standard of comparison; and in each case the nature of the operation, duration of anæsthesia, the amount of ether expended, and the temperature of the operating theatre were recorded, and the results are given in the attached tables.

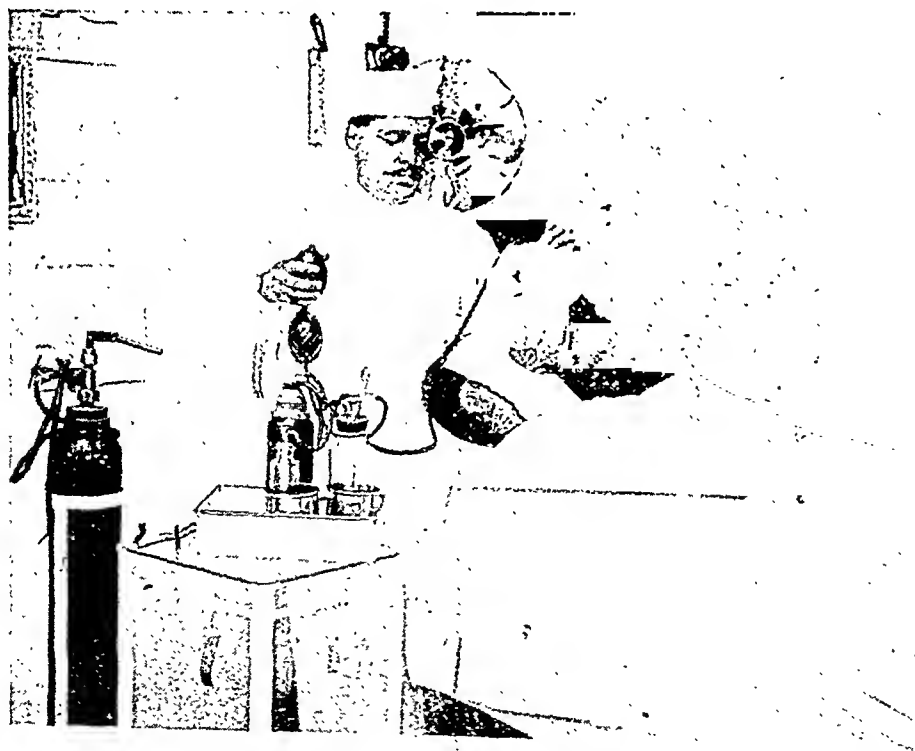
In such a catholic series, classification is not easy, and in the present case the classification of the official annual return has been followed as closely as possible. Thus Table I gives a series of 11 cases in which the appendix was the main object of attack, but includes one gastro-enterostomy and one colostomy and a combined cholecystostomy and appendicectomy; while Table II gives a series of operations for hernia, but includes two epiploplexies.

Study of these records will, it is felt, completely dispose of the myth that open ether anæsthesia is impossible during the Indian hot weather; especially when it be remembered that operations are, when possible, performed before the heat of the day, and that even in the height of the hot weather, when shade temperatures vary between 110°F. and 118°F. or even higher, the temperature of the operating theatre seldom

the cost estimated; the price of ether having been taken at Rs. 3 per pound of 16 ounces. It will not, we think, be seriously urged that Re. 1-14 is an exorbitant price to pay for the additional safety to the patient and comfort to the operator in an operation for appendicitis lasting 50 minutes, performed on 6th May with a theatre temperature of 95°F.

For the benefit of those of our readers who may be inclined to agree with our contention a few words on the subjects of preparation and administration will perhaps not be out of place.

Preparation.—Where possible a light aperient is administered 36 hours before operation, and unless operation on the large intestine is anticipated, no further interference with the alimentary tract takes place. During the day prior to operation the patient is kept on a low residue diet, and glucose combined with large doses of alkali is generously administered. On the morning of operation food is withheld, but water, or better, 5 per cent. glucose in orange or lime squash is permitted. Half to three-quarters of an hour before operation the patient, if adult, receives a hypodermic injection of $\frac{1}{4}$ gr. morphia and 1/100 gr. atropin, which lessens anxiety and controls salivation.



reaches and practically never exceeds 100°F. —fortunately for the surgeon in his gown and mask! In the hot weather the expenditure of ether is, of course, greater, but the writers, on studying their records, have been surprised how small the difference actually is; while exactly the same applies to chloroform, with the additional factor of deterioration, which, in our experience, does not occur with ether.

With regard to expense, the average expenditure of ether has been struck for each series and

Administration.—The anæsthetic is administered with the apparatus designed by Dr. F. E. Shipway, Senior Anæsthetist to Guy's Hospital, of which the details can be seen in the accompanying photograph. The apparatus can be used for the administration of chloroform, C. E. mixture or pure ether by altering the control lever on the dial. The ether bottle stands in a metal reservoir which contains, in the cold weather, warm water to facilitate evaporation, and in the hot weather, freezing mixture to control it.

From thence it is conducted through water in a "Thermos" container kept at 90°F., so that, cold weather or hot, the ether vapour reaches the patient moist and warm—an important consideration in the prophylaxis of post-anæsthetic lung trouble. In practised hands induction by ether from the start yields the best results from the point of view both of the patient and the surgeon; but those starting this method of anæsthesia may find it convenient, at first, to induce with C. E. The writers deprecate induction with chloroform and maintenance with ether; in fact, generally speaking, the less chloroform that reaches the patients the more comfortable they are, and in the great majority of cases they avoid its use altogether. In only one of the cases recorded (Table I, case 1) was induction carried out with other than pure ether, and in this case the drug used for the purpose was C. E.

The patient having been placed on the table, a gamgee tissue mask, cut to expose nose and mouth, is placed over his face, and the Schimmelbusch mask with rubber ether connection placed on it so as to fit snugly but not uncomfortably. Induction is then commenced with vigorous but regular compression of the bellows at about 2 per second, the patient meanwhile breathing deeply. With the onset of the second stage, the Schimmelbusch mask is covered by the "concentrating mask" similar in structure to the face pad, but with a smaller central aperture, and surgical anæsthesia is rapidly and easily produced. The average induction time is about 7 minutes in a patient of temperate habits. Surgical anæsthesia having been secured it is maintained by about one pressure of the bellows per second, deepened, as required by the surgeon, by increasing the frequency of the ventilation; and when the patient is comfortably "under," administration is much simplified by the insertion of the "anæsthetic airway" in use at the Mayo Clinic, and obtainable from Messrs. Down Bros. This instrument, which combines the functions of keeping the tongue forward and the airway clear, is seen attached with tape to the anæsthetic table in the accompanying photograph, which shows Shipway's apparatus and masks in use.

With experience, the depth of the anæsthesia can be gauged almost entirely by the respiration; and the corneal reflex is only consulted at most twice or thrice at long intervals. In these circumstances it is a reliable guide, and not, as is often the case with chloroform administration, "fatigued" out of existence. When morphine has been administered prior to operation the anæsthesia should never be pushed to dilatation, the pupil being maintained contracted, and the corneal reflex just coming and going. In severe operations a slow stream of oxygen may be administered by the nasal catheter with great advantage, or the oxygen cylinder may be connected to the ether bottle and oxygenated ether administered direct. In these conditions vomiting on "coming round" is the exception, rather than

the rule, and the patient leaves the table with good pulse and colour.

Finally, reference must be made to post-anæsthetic respiratory troubles. On first adoption of this method of anæsthesia, the anæsthetist will be chagrined and exercised by the fact that some of his patients develop a sharp cough and congestion at the bases of their lungs. In some cases definite patches of consolidation will occur, and he may even lose an enfeebled or elderly patient in consequence. But with practice he will find that these complications grow very much rarer, and, in all ordinary routine cases, cease altogether. On reflection he will realise that the secret lies in *steady* administration. The inexperienced anæsthetist is continually consulting the pupil, with the result that his ether dosage is spasmodic. He omits to put in the airway, and has to grope after the tongue; the patient becomes "lighter" and the surgeon expresses himself with pungency and point. Result:—a frenzied pumping in of ether to bring the patient and the surgeon into the desired condition; and the patient, whose lungs have been relatively free of ether, receives a concentrated and irritating dose. Should such a contretemps occur, the wise anæsthetist will unobtrusively turn on the oxygen, and invent replies to subsequent enquiries regarding excessive expenditure of cylinders. With experience, however, he will find that close observation of the breathing combined with *regular* administration will keep the patient satisfactorily anæsthetised and obviate the necessity for these subterfuges, and reduce his post-anæsthetic lung complications to a negligible percentage.

Since the foregoing was written, one of the writers has had the opportunity of seeing in use the extremely ingenious apparatus for open ether designed by Captain C. V. Thornton, R.A.M.C. (ret'd.), in Bombay. This apparatus consists of a pear-shaped graduated glass reservoir connected by flexible rubber tube to a metal tap which is carried upon a stirrup fixed to a Schimmelbusch mask. Ether is thus delivered on to the mask by gravity, and the rate of flow is regulated by the metal tap which ensures an absolutely even administration. The mask is applied over a face pad similar to, but thicker than that in use by the writers. In place of the concentrating pad used by the latter, Dr. Thornton's Schimmelbusch mask is fitted with a metal cover which exposes only a small central area, cruciform in shape, of the lint.

The apparatus has the great advantage of ensuring absolutely regular administration and therefore of reducing the risk of lung complications to a minimum, and carries an attachment for oxygen if required. The climate of Bombay supplies the necessary warmth and moisture, and the anæsthesia, produced from the surgeon's point of view, is most satisfactory. Its only drawback appeared to be that evaporation cannot be controlled, as in Shipway's apparatus, by a water-bath, which would seem to render it relatively

more wasteful of ether. This would probably be an obstacle to its general employment in the plains of the north of India.

CONCLUSIONS.

1. That the administration of open ether is perfectly practicable, even in the Indian hot weather.

2. That its properties make it the anæsthetic of choice in all surgical procedures where its exhibition is not contra-indicated.

3. That the contra-indications are identical with those in temperate climates.

APPENDIX.

TABLE I.

Operations on the Stomach and Intestines, including Appendix.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	17-11-26	H. F.	Appendicectomy. Division of ileal and sigmoid kinks.	2 hours	9 ozs.	76° F.
2	8-4-27	H. M.	Appendicectomy and cholecystostomy.	2 hours	15 ozs.	86° F.
3	15-4-27	H. M.	Appendicectomy. Division of ileal kink.	1 hour 20 minutes	10 ozs.	90° F.
4	2-5-27	H. M.	Appendicectomy. Division of ileal kink.	1½ hours	12 ozs.	88° F.
5	6-5-27	H. M.	Appendicectomy	50 minutes	10 ozs.	95° F.
6	15-7-27	H. M.	Appendicectomy. Division of ileal and sigmoid kinks.	1 hour 50 minutes	8 ozs.	92° F.
7	26-7-27	H. M.	Appendicectomy	40 minutes	8 ozs.	90° F.
8	2-8-27	H. M.	Appendicectomy	45 minutes	6 ozs.	80° F.
9	2-5-27	H. M.	Appendicectomy	1½ hours	12 ozs.	88° F.
10	12-3-27	H. M.	Colostomy for intestinal obstruction.	1 hour	4 ozs.	88° F.
11	30-12-26	H. M.	Gastro-enterostomy	2 hours	10 ozs.	72° F.

Average ether used per head; 9.4 ozs.

Cost per operation, Re. 1-12-2.

TABLE II.

Operations on the Abdominal Wall and Cavity, Operations for External Hernia.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	18-11-26	H. M.	Right inguinal hernia (for radical cure).	½ hour	1½ ozs.	78° F.
2	4-12-26	H. M.	Right inguinal hernia (for radical cure).	1 hour	4 ozs.	74° F.
3	14-12-26	H. M.	Right inguinal hernia (for radical cure).	1½ hours	5 ozs.	72° F.
4	30-11-26	H. M.	Oblique inguinal hernia (omental) for radical cure.	45 minutes	4 ozs.	76° F.
5	17-12-26	H. M.	Right inguinal hernia (for radical cure).	45 minutes	5 ozs.	70° F.
6	24-2-27	H. M.	Double inguinal hernia (for radical cure).	1½ hours	6 ozs.	62° F.
7	15-3-27	H. M.	Right inguinal hernia (for radical cure).	1½ hours	8 ozs.	83° F.
8	15-4-27	H. M.	Double bubonocoele (for radical cure).	1½ hours	6 ozs.	96° F.
9	22-4-27	H. M.	Ventral hernia (for radical cure).	1½ hours	6 ozs.	94° F.
10	28-4-27	H. M.	Inguinal hernia (for strangulation).	40 minutes	10 ozs.	96° F.
11	15-4-27	H. M.	Inguinal hernia (for strangulation).	45 minutes	2 ozs.	92° F.
12	31-7-27	H. M.	Inguinal hernia (for strangulation).	40 minutes	5 ozs.	92° F.

TABLE II.—*Contd.*

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
13	20-8-27	H. M.	Herniotomy, appendicectomy and incision of tunica vaginalis for hydrocele.	2 hours	12 ozs.	82° F.
14	3-6-27	H. M.	Oblique inguinal hernia.	....	8 ozs.	96° F.
15	23-8-27	H. M.	Bubonocle both sides (for radical cure).	1½ hours	10 ozs.	82° F.
16	6-7-27	H. M.	Bubonocle (for radical cure).	½ hour	8 ozs.	93° F.
17	6-7-27	H. M.	Inguinal hernia (for radical cure).	2 hours	8 ozs.	84° F.
18	20-7-27	H. M.	Laparotomy (for peritonitis).	1½ hours	10 ozs.	90° F.
19	31-3-27	H. M.	Laparotomy (for intestinal obstruction).	1 hour 20 minutes	12 ozs.	94° F.
20	23-2-27	H. M.	Epiploxy	20 minutes	1½ ozs.	64° F.
21	26-4-27	H. M.	Epiploxy	30 minutes	3 ozs.	96° F.

Average ether used per head: 6.5 ozs.
Cost per operation, Re. 1-2.

TABLE III.
Operations on the Rectum and Anus.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	7-12-26	H. M.	Removal of hæmorrhoids	20 minutes	4 ozs.	71° F.
2	14-12-26	H. M.	Removal of hæmorrhoids	30 minutes	3 ozs.	72° F.
3	16-12-26	H. M.	Removal of hæmorrhoids	25 minutes	2 ozs.	73° F.

Average ether used per head; 3 ozs.
Cost per operation, annas twelve only.

TABLE IV.
Operations on the Bladder and Prostate.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	30-11-26	H. M.	Litholapaxy	½ hour	4 ozs.	76° F.
2	4-1-27	H. M.	Litholapaxy	20 minutes	1½ ozs.	70° F.
3	27-1-27	H. M.	Litholapaxy	1 hour	6 ozs.	68° F.
4	29-1-27	H. M.	Suprapubic lithotomy	25 minutes	4 ozs.	70° F.
5	1-2-27	H. M.	Suprapubic lithotomy	25 minutes	2 ozs.	70° F.
6	23-2-27	H. M.	Suprapubic lithotomy	1 hour	3 ozs.	64° F.
7	20-2-27	H. M.	Litholapaxy	½ hour	3 ozs.	92° F.
8	13-4-27	H. M.	Litholapaxy	½ hour	4 ozs.	96° F.
9	1-5-27	H. M.	Litholapaxy	45 minutes	8 ozs.	70° F.
10	10-5-27	H. M.	Suprapubic cystotomy	45 minutes	10 ozs.	96° F.
11	9-7-27	H. M.	Litholapaxy	½ hour	5 ozs.	84° F.
12	21-7-27	H. M.	Suprapubic cystotomy	½ hour	8 ozs.	92° F.
13	27-7-27	H. M.	Litholapaxy	½ hour	8 ozs.	94° F.
14	15-3-27	H. M.	Suprapubic cystotomy	½ hour	4 ozs.	82° F.
15	30-3-27	H. M.	Litholapaxy	½ hour	6 ozs.	80° F.
16	25-5-27	H. M.	Litholapaxy	45 minutes	6 ozs.	100° F.
17	10-3-27	H. M.	Prostatectomy (open operation).	1½ hours	10 ozs.	84° F.
18	16-7-27	H. M.	Prostatectomy (open operation).	1 hour 50 minutes	8 ozs.	92° F.

Average ether used per head; 5.15 ozs.
Cost per operation, annas fifteen and pies six.

TABLE V.
Operations on the Male Generative Organs.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	16-2-27	H. M.	Double radical cure of hydrocele.	$\frac{1}{2}$ hour	4 ozs.	74° F.
2	21-7-27	H. M.	Radical cure of hydrocele.	$\frac{1}{2}$ hour	4 ozs.	92° F.
3	27-6-27	H. M.	Radical cure of hydrocele.	$\frac{1}{2}$ hour	8 ozs.	96° F.
4	24-4-27	H. M.	Complete amputation of the penis for epithelioma.	$\frac{1}{2}$ hour	3 ozs.	94° F.

Average ether used per head: 4.7 ozs.
Cost per operation, annas fifteen.

TABLE VI.
Operations on the Veins.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	29-3-27	H. M.	Removal of varicose veins of leg by dissection.	1 hour 20 minutes	12 ozs.	94° F.

Cost per operation, Rs. 2-4.

TABLE VII.
Operations on Tumours.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	31-12-26	H. F.	Removal by enucleation (fibroma left thigh).	2½ hours	10 ozs.	72° F.
2	21-12-26	H. F.	Excision of cancerous glands from axilla.	$\frac{1}{2}$ hour	3 ozs.	69° F.
3	15-2-27	H. F.	Radical excision of breast.	1½ hours	5 ozs.	70° F.
4	27-3-27	H. M.	Radical excision of breast.	1½ hours	6 ozs.	64° F.
5	24-3-27	H. F.	Excision of fibroma, abdominal wall.	$\frac{1}{2}$ hour	3 ozs.	88° F.
6	15-4-27	H. F.	Excision of soft fibroma foot.	1 hour	6 ozs.	96° F.

Average ether used per head: 5.5 ozs.
Cost per operation, annas fifteen.

TABLE VIII.
Operations on Lymphatics.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	21-7-27	H. M.	Excision of cancerous glands, both groins.	1½ hours	10 ozs.	92° F.
2	9-4-27	H. M.	Excision of cancerous glands.	$\frac{1}{2}$ hour	2 ozs.	83° F.
3	12-5-27	H. M.	Excision of cancerous glands, both groins and iliac fossa.	2 hours 10 minutes	14 ozs.	96° F.
4	6-5-27	H. M.	Removal of tuberculous glands, axilla.	$\frac{1}{2}$ hour	4 ozs.	90° F.
5	25-3-27	H. M.	Removal of tuberculous glands, axilla.	1 hour	6 ozs.	82° F.

Average ether used per head: 7.2 ozs.
Cost per operation, Re. 1-5.

TABLE IX.
Operations on Bones.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	22-12-26	H. M.	Sequestrotomy, for necrosed radius.	$\frac{1}{2}$ hour	3 ozs.	69° F.
2	18-2-27	H. M.	Plating of fractured clavicle.	1 $\frac{1}{2}$ hours	7 ozs.	74° F.
3	8-3-27	H. M.	Plating of ununited fracture, left humerus.	1 $\frac{1}{2}$ hours	10 ozs.	93° F.
4	4-7-27	H. M.	Plating of fractured radius.	1 hour	5 ozs.	93° F.
5	9-8-27	H. M.	Sequestrotomy. Right ulna for osteomyelitis.	$\frac{1}{2}$ hour	3 ozs.	93° F.
6	16-8-27	H. M.	Plating of malunited fracture, radius and ulna.	1 $\frac{1}{2}$ hours	10 ozs.	72° F.
7	13-12-26	H. M.	Radical cure of myeloma of the humerus by open method.	1 $\frac{1}{2}$ hours	8 ozs.	70° F.
8	2-2-27	H. M.	Plating old malunited fracture of the surgical neck of the humerus.	2 $\frac{1}{2}$ hours	10 ozs.	94° F.
9	14-7-27	H. M.	Operation for painful callus of radius.	35 minutes	3 ozs.	94° F.
<i>Lower Extremity.</i>						
10	16-12-27	H. M.	Sequestrotomy. Right tibia and fibula.	20 minutes	2 ozs.	74° F.
11	11-3-27	H. M.	Plating fractured patella	1 $\frac{1}{2}$ hours	14 ozs.	82° F.
12	12-3-27	H. M.	Sequestrotomy, tibia.	45 minutes	2 $\frac{1}{2}$ ozs.	88° F.
13	26-4-27	H. M.	Plating of fractured tibia.	1 $\frac{1}{2}$ hours	1 $\frac{1}{2}$ ozs.	94° F.
14	26-4-27	H. M.	Plating of fractured, left fibula (multiple).	2 hours	....	96° F.
15	11-7-27	H. M.	Sequestrotomy of tibia and fibula.	1 hour	8 ozs.	90° F.
16	9-8-27	H. M.	Plating of fractured right fibula.	$\frac{1}{2}$ hour	4 ozs.	93° F.
17	1-6-27	H. M.	Sequestrotomy of left femur.	1 $\frac{1}{2}$ hours	10 ozs.	100° F.

Average ether used per head: 5.9 ozs.
Cost per operation, Re. 1.

TABLE X.
Operations on Joints.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	17-12-27	H. M.	Reduction of posterior dislocation of the hip-joint by open method.	3 hours	10 ozs.	74° F.
2	21-4-27	H. M.	Arthroplasty for stiff elbow-joint.	1 $\frac{1}{2}$ hours	6 ozs.	96° F.
3	2-2-27	H. M.	Reduction of dislocation of the hip-joint. Open method.	2 hours	8 ozs.	70° F.

Average ether used per head: 8 ozs.
Cost per operation, Re. 1-8.

TABLE XI.
Amputations.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	1-1-27	H. F.	Amputation by circular flaps of gangrenous humerus.	25 minutes	2 ozs.	68° F.
2	5-5-27	H. M.	Amputation of the leg by Syme's method for papilloma.	1 hour	4 ozs.	98° F.
3	17-5-27	H. M.	Amputation of gangrenous foot.	45 minutes	8 ozs.	96° F.
4	18-5-27	H. M.	Amputation of the leg for epithelioma of foot.	45 minutes	8 ozs.	98° F.
5	12-7-27	H. M.	Amputation for compound fracture of arm.	$\frac{1}{2}$ hour	8 ozs.	93° F.
6	28-7-27	H. M.	Amputation: right arm for periosteal sarcoma.	$\frac{1}{2}$ hour	4 ozs.	82° F.

Average ether used per head: 3 ozs.
Cost per operation, annas nine.

TABLE XII.
Obstetric and Gynecological Operations.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	13-12-26	H. F.	Application of forceps for obstructed labour and prolapsed arm.	$\frac{1}{2}$ hour	4 ozs.	74° F.
2	11-5-27	H. F.	Perineorrhaphy for ruptured vagina and perineum.	$\frac{1}{2}$ hour	10 ozs.	94° F.
3	14-1-27	H. F.	Curetting of uterus for endometritis.	25 minutes	2 ozs.	68° F.

Average ether used per head: 7 ozs.
Cost per operation, Re. 1-5.

TABLE XIII.
Operation on the Skin and Subcutaneous Tissues.

No.	Date.	Class and sex of patient.	Nature of operation.	Duration of anæsthesia.	Quantity of ether used.	Temperature of theatre.
1	11-7-27	H. M.	Plastic operation for cancrum oris.	1 hour	4 ozs.	95° F.

Cost per operation, annas twelve.

THE THERAPEUTIC ACTIVITY OF LIQUID PREPARATIONS OF ERGOT ON THE CALCUTTA MARKET.

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As early as 1859 Büchheim stated that the activity of ergot varied a great deal. He said

that ergot from wet places is inactive, while preparations made from active ergot lose their activity and that no method of producing a staple preparation was known. He, therefore, preferred to administer the drug in the form of a powder and gave it in 15 to 20 grain doses every 15 to 20 minutes, until the desired action occurred. The position to-day is similar and many liquid preparations of ergot on the market are pharmacologically and therapeutically quite inert. Last year Prof. A. J. Clark(1) in a paper entitled "Do the pharmacopœial preparations of

ergot contain any active principles?" pointed out that the preparations of ergot, described in the *British Pharmacopæia*, cannot contain more than traces of the active principles. It is well known that the active principles of ergot can be divided into two main groups:—

- (1) The specific alkaloids, ergotoxin and ergotamin, which have the same action.
- (2) A number of non-specific substances which are mostly products of protein break-down, etc. These include bodies like tyramin, histamin, agmatin, cholin, acetyl-cholin, methylamin, ethylamin, etc.

It is an established fact that the therapeutic action of ergot, when given by the mouth, depends on the specific alkaloids present in it and not on the large number of non-specific amines. These latter bodies are not absorbed into the circulation and produce little or no systemic action when given in ordinary doses by the oral route. Clark has shown that while 15 mgm. of

ously in a human being produced a marked fall of blood pressure, considerably larger doses would be required to produce the same effect when given orally. The reason is that the liver can break down tyramin and can store histamin. They fail, therefore, to get into the circulation.

It has been definitely proved that the method of preparation of both the solid and liquid extracts laid down in the *British Pharmacopæia* precludes there being anything but mere traces of these alkaloids. It is for this reason that the clinicians in this country have doubted the efficacy of these preparations and have shown a distinct preference for some of the preparations in the market manufactured by specially devised methods; extract of ergot prepared by the *United States Pharmacopæia* method are not generally easily available. As we have often been asked to express our opinion regarding the relative merits of these preparations, we undertook to determine the alkaloid content of a number of them bought at random from the Calcutta market. For the assay of the alkaloidal content we used the method described

Table showing the Alkaloid Content of Ergot Preparations on the Market.

Number.	Description of the sample assayed.	Amount of ergot preparation required to reverse the action of 0.1 c.c. of 1 in 1,000 solution of adrenalin.	Ergotoxin content.	REMARKS.
1	Sample prepared by <i>British Pharmacopæia</i> method.	1 c.c. of extract did not reverse.	Practically nil ..	
2	Do.	1 c.c. had a tendency to reverse.	Only traces of alkaloids	
3	Do.	1 c.c. did not reverse ..	Practically nil ..	
4	Do.	0.5 c.c. did not reverse	Do. ..	
5	Do.	0.5 c.c. did not reverse, but had a tendency to reverse.	Traces ..	
6	Sample prepared by a well-known Indian firm—not by <i>B. P.</i> method.	0.5 c.c. did not reverse, but had a tendency to reverse.	Do. ..	
7	Sample prepared by a well-known American firm—not by <i>B. P.</i> method.	0.075 reversed ..	0.0022 mgm. per c.c. ..	This preparation is one of those preferred by Calcutta practitioners.
8	Sample prepared by a well-known English firm by special method.	0.025 c.c. reversed ..	0.00664 mgm. per c.c. ..	Do.
9	Sample prepared by <i>U. S. P.</i> method.	0.015 c.c. reversed ..	0.01101 mgm. per c.c. ..	Specially prepared by Bengal Chemical & Pharmaceutical Works from Spanish ergot for our tests.
10	<i>Liq. Ergot Fortis</i> ..	0.02 c.c. reversed ..	0.0083 mgm. per c.c. ..	Prepared by Bengal Chemical & Pharmaceutical Works by the method described in this paper.
11	Do. ..	0.02 c.c. reversed ..	0.0083 mgm. per c.c. ..	Do.
	Do. ..	0.0225 c.c. reversed ..	0.00734 mgm. per c.c. ..	Do.

tyramin produce a distinct rise of blood pressure when injected subcutaneously in man, 200 mgm. by the mouth cause little or no action. Similarly, while 0.5 mgm. of histamin given intravenously in a cat or 2 to 4 mgm. subcutane-

by Broom and Clark.(2) As many samples of different preparations as possible were assayed with different pieces of the same rabbit's uterus under similar conditions, so that the results obtained were comparable. The alkaloid content

was calculated from the amount of ergotoxin phosphate required to reverse completely the action of 0.1 c.c. of 1 in 1,000 solution of adrenalin. It is worthy of note here that both ergotoxin and ergotamin are effective in reversing the action of adrenalin on the rabbit's uterus, the latter being somewhat less powerful. The total alkaloids by this method are determined in terms of ergotoxin.

We further asked the Bengal Chemical and Pharmaceutical Works, Ltd. to prepare for us fresh extracts of ergot by the method laid down in the *United States Pharmacopæia* and, if possible, to devise a suitable method by which the alkaloidal contents could be increased in preparations. This they very kindly did, and we are greatly obliged to their head chemist, Mr. J. Lahiri, M.Sc., for his help and co-operation. This preparation was named *Liq. Ergot Fortis* and was prepared in the following way:—

"Ergot in 20 mesh powder is kept moistened with a sufficient quantity of 50 per cent. w/v alcohol and hydrochloric acid (the acid taken should be 0.5 per cent. HCl of the weight of ergot taken) for 48 hours, with occasional stirring and afterwards pressed. The liquor is set aside to be used afterwards.

The marc is repeatedly moistened with 50 per cent. w/v alcohol and pressed until exhausted. The pressed liquors from the repeated macerations are mixed together and distilled *in vacuo*. The thick magma left in the vacuum pan is mixed with the liquor that was kept aside and afterwards the whole of it is mixed with the requisite quantity of rectified alcohol and water, so as to bring the product 1 to 1 containing 82 per cent. proof-spirit as the spirit strength."

A perusal of the table will show that the extract of ergot, prepared by the method laid down in the *British Pharmacopæia* and offered for sale in Calcutta, contains little or no active alkaloid. The method laid down by the *United States Pharmacopæia* and some of the special methods, including that devised by the Bengal Chemical and Pharmaceutical Works Ltd. for *Liq. Ergot Fortis*, give a reasonable alkaloid content and should be therapeutically active.

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EXPERIMENTS ON THE DIGESTIBILITY OF DIFFERENT KINDS OF RICE AND RICE PREPARATIONS.

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For many centuries rice has been the staple article of food of most Indians. Very many improvements must have been made in the mode of its cultivation from time to time, so that to-day

such fine specimens of it are found, that no grain in the country can rival it in the dearthness of its price. Its ancestral forms are also flourishing, which offer the cheapest food grain for the poorer classes. Some time ago, I carried on experiments on some 30 different kinds of rice available in the local market, and found that they vary very much in their digestibilities.

Experiments must also have been done in the past to determine the best method of preparing it for use at table from the economical, physiological and aesthetic points of view. Out of the various methods that must have been followed in the past, two of them are still prevalent, and have become more or less standardised. These are boiling and parching. The object of the present work was to determine which of these two methods is better suited to digestion. These experiments have been carried out with saliva in test-tubes, and it has been concluded that what is true of saliva is probably also true of other digestive enzymes.

Parched rice is the favourite food of the poorer classes, and for this reason only the cheapest kind of grain enters into its preparation. There are two chief ways in which it is parched. The product of one is the preparation called *kheel* or *lava*, and of the other *parmal* or *murmura*.

The method of experiment in brief is to take measured quantities of these substances, subject them to salivary digestion in test-tubes, and subsequently determine their sugar-content. I give below short reviews of some of the more important concluding experiments that I performed.

Experiment I.

Took 0.2 gms. each of

1. *Kheel*.
2. The same whole rice that is used in the preparation of *kheel*.

Rice was boiled in 4 c.c. of water over a water-bath for $3\frac{1}{4}$ of an hour. This time in the water-bath was found to be just more than sufficient to bring even the cheapest rice to the full boil (superior qualities take much less time). The water-bath was used for various reasons which need not be given. By the term "full" boil I mean the state when even the deepest interior of the grain becomes soft. When rice had been boiled it was cooled down to 40°C. In another tube was placed the weighed amount of *kheel*. Water was added to it, and it was made up to the same level as in the other tube. Half a c.c. of saliva was added to each tube. In this, as well as in other experiments, saliva was taken from the same person; no sialogogues were used. It was collected as it dribbled out from the mouth hanging low. As saliva is apt to differ in the content of its ptyalin, the active principle—at different times of the day it was, as far as possible, always taken at the same fixed hour every time. By the way, it was also noticed that it differed very little in its content of ptyalin from day to day when taken at the same fixed hour. The tubes were kept on a water-bath at 40°C.

and digestion was allowed to continue for half an hour. They were then taken out, and boiled to stop further action. Their contents were subsequently thoroughly ground in a mortar and more water added. The amount of reducing sugar formed was determined by the number of c.c. of Benedict's solution reduced. This was taken as the measure of the amount of digestion. The results were as follows:—

NUMBER OF C.C. OF BENEDICT'S SOLUTION REDUCED.

<i>Kheel.</i>	Rice.
41 c.c.	15.5 c.c.

Experiment II.

This experiment was carried out to determine whether boiling has any further effect on the velocity of digestion of *kheel*. It was observed that boiling did not enhance its digestibility any further.

Experiment III.

This experiment was carried out on *kheel*, and rice prepared from the same stock of rice with its husk intact. This time three substances were compared.

NUMBER OF C.C. OF BENEDICT'S SOLUTION REDUCED.

	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.
Bazaar <i>Kheel</i>	26	36	39	40	40	40
<i>Kheel</i> rice (only husk removed) ..	1	1½	2	2½	3	4½
<i>Kheel</i> rice (broken into pieces) ..	7	15	18	19	20	21
Best market rice	9	18	23	24	24½	24½

- (1) *Kheel*.
- (2) Rice (only husk removed).
- (3) Rice (husk removed and broken into pieces before boiling).

six tubes of each substance were taken out during the course of half an hour. Their contents were thoroughly ground in a mortar and their sugar content determined as usual.

NUMBER OF C.C. OF BENEDICT'S SOLUTION REDUCED.

	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.
<i>Kheel</i>	29	38	39	41	41	41
<i>Parmal</i>	27	37	39	40	41	41½

The results were:—

NUMBER OF C.C. OF BENEDICT'S SOLUTION REDUCED.

<i>Kheel.</i>	Rice (only husk removed).	Rice (broken into pieces).
35 c.c.	5 c.c.	19.5 c.c.

It may be mentioned here that *kheel* prepared in the laboratory was not as good as the bazaar substance. It did not puff to the same extent. Again rice No. 2 had its outer coat intact whereas during the usual husking process this outer coat

is broken at several places which exposes the more digestible interior. This probably is the reason for the discrepancy in the results. For a similar reason rice No. 3, which was broken into pieces, reduced a greater quantity of Benedict's solution.

Experiment IV.

This time comparison was made between the best market rice and bazaar *kheel*.

NUMBER OF C.C. OF BENEDICT'S SOLUTION REDUCED.

Best market rice.	Bazaar <i>Kheel</i> .
22 c.c.	41 c.c.

Experiment V.

Up to now all the digestions had been carried on for half an hour. A second series of experiments was now carried out to determine the velocity of digestion at different times during the course of half an hour. For each substance six tubes were taken and up to the stage of putting saliva into them were treated as those in the previous experiments. Afterwards, after every five minutes, one tube from each lot was taken out, boiled and put aside. In this way all the

Experiment VI.

This time an experiment was carried out to compare *kheel* and *parmal*, the two main preparations of parched rice.

Experiment VII.

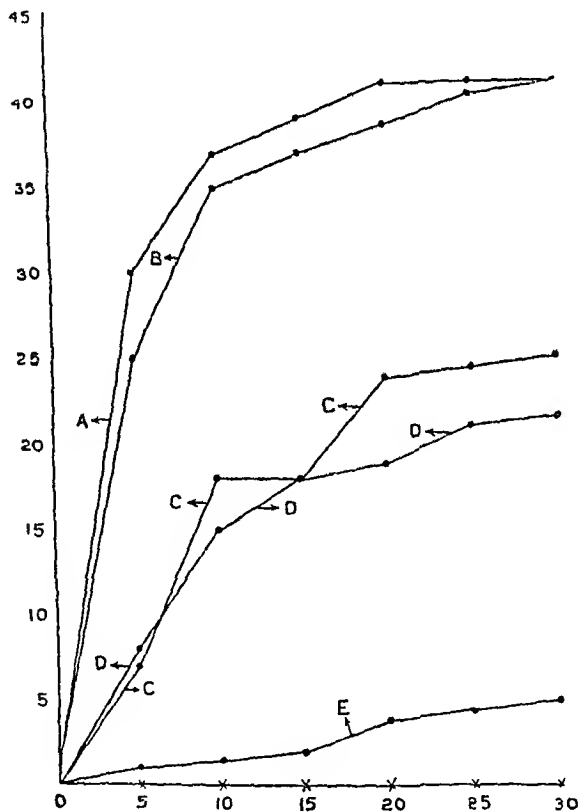
As all the above experiments were carried out on different occasions, naturally every time different saliva was used. In spite of all these differences the results have been markedly uniform. However, to be doubly sure, some of the above experiments were repeated on one day on saliva taken from the same source.

The following substances were selected:—

NUMBER OF C.C. OF BENEDICT'S SOLUTION REDUCED.

	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.
Bazaar <i>Kheel</i> ..	30	37	39	41	41	41
<i>Parmal</i>	26	35	37	38½	40½	41
<i>Kheel</i> (husk only removed) ..	1	1½	2	4	4½	5
<i>Kheel</i> rice (broken into pieces) ..	8	15	18	19	21	21½
Best market rice	7	18	18	24	24½	25

The above results can be seen at a glance by looking at the graph.



Curve A is that of *kheel*. It is at once evident that within the short space of 5 minutes its digestion has advanced remarkably. It has reduced as much as 30 c.c. Benedict's solution or, in other words, half of the total weight of *kheel* has been converted into sugar which came from its carbohydrate store (25 c.c. of Benedict's solution require 0.074 gms. of maltose, the sugar formed during salivary digestion, for its reduction); during the course of the next 25 minutes only 11 c.c. more of the solution will be reduced. In fact this number had been reached as early as 20 minutes and during the remaining 10 minutes

there was no further digestion. As will be remembered, we took only 0.2 gms. of *kheel* for our experiment and nearly 0.12 gms. have been already converted into maltose, the amount required for the number of c.c. of Benedict's solution reduced. This leaves us only 0.08 gms. more of the weight of *kheel* which has not been converted into sugar. Out of this nearly 0.04 gms. is non-carbohydrate material, water included. This leaves us 0.04 gms. of carbohydrate not acted upon by ptyalin of saliva. Has ptyalin become inactive, or is there no more available digestible carbohydrate material left? Boiling had no effect as will be remembered from experiment II. Possibly the ptyalin had become inactive. To test this a further experiment was carried out. Some more weight of *kheel* was added to the already digested material in the tube. Ptyalin was found to be still active as more reducing sugar was formed: 0.04 gms. out of 0.02 gms., or in other words 25 per cent. of the weight of *kheel* probably represents its indigestible fibrous or cellulose material. Possibly some of this indigestible material may be acted upon by the more active pancreatic ferment. Curve B shows the velocity of digestion of *parmal*. It closely follows the curve A. It is slightly lower in the beginning, reaching the same height as A after half an hour. It has a tendency to go still higher after that time. This indicates that it contains a higher percentage of digestible carbohydrate material than *kheel*. This point will be further discussed.

Curve C is from the best available market rice. Its curve is much lower than either of the above two curves. This contrast becomes much more evident when we come to the lowest curve E, the rice from which *kheel* and *parmal* are prepared. Curve D is from the same rice as E, but broken into pieces before boiling. This nearly follows C, the curve from the best available rice. This points to the desirability of breaking inferior kinds of rice into small particles if its digestibility is to be increased. The same advantage to some extent can also be

obtained by breaking the outermost fibrous coat at several places, and exposing the digestible interior to the action of digestive ferments. This also indicates that it is chiefly the outer fibrous coat which mostly obstructs the passage of ferments, and when it is broken up, even the most inferior kind of rice reaches the level of digestibility of the best market rice.

There is a belief prevalent amongst Indians, specially the *hakim* class, that *murmura* or *parmal* is an easily digestible food for patients with weak digestions. *Hakims* generally allow *murmura* to their patients when they will deny every other kind of food. This is particularly the case with children who are always found to be very fond of such things. This belief appears to be well founded. The above findings are only test-tube results. Results may be different when carried out in the tube of the alimentary canal. They will, however, be far more favourable for *kheel* and *parmal* and equally less favourable for boiled rice. *Kheel* and *parmal* being the most dry foods excite the largest amount of saliva, and being also the most starchy excite the largest amount of ferment secretion. Again psychical factors, not to be neglected, specially in salivary digestion, are also more favourable for parched rice than for inferior grades of boiled rice. During parching a special kind of agreeable flavour is developed in rice which is not originally present. This also is a greater factor in exciting a psychical flow. Boiled rice on the other hand is not only very insipid when it comes from cheap rice, but also being already semi-solid and taken in the form of a formed bolus is so easily and readily gulped down the oesophagus that saliva need not be secreted to make it moist, and the teeth and tongue come to help in mixing it with saliva and forming a bolus. This should give undue rest to the teeth which, from the lack of exercise and cleansing action of the large amount of watery saliva, should tend easily to become carious and fall out. *Kheel* and *parmal* not only excite large quantities of saliva, but are also thoroughly mixed with it by the grinding action of the teeth; this process being not only of great advantage in digestion, but also of great benefit to the teeth themselves.

In this connection I may also mention that a prejudice exists amongst *hakims* that whereas *parmal* or *murmura* are considered good for the patients, *kheel* is regarded otherwise. It is said to cause vague bowel troubles. As far as the digestibility is concerned, *kheel* is the most easily digestible of all the rice preparations. Its very rapid digestibility cannot be a factor in causing bowel troubles. Even if it were, it can be easily dismissed when we see that the favourite *murmura* is not far behind it. Both *kheel* and *parmal* are prepared from the same kind of inferior grain. The difference probably lies in the mode of their preparation. If we peel off the outer husk from the grain, rice is still found to be covered by a fibrous coat which is nominal in the

case of the superior grades, and tough in case of the inferior. This tough covering is much broken during the husking process. During the parching of *kheel*, although the starch granules are thoroughly exposed, the tough outer covering remains adhering to them. This becomes tougher still during parching, probably on account of the larger percentage of proteins in it which get coagulated inside the tough cellulose covering, and glue the fibres closer still. These proteins get less digestible after boiling. For a similar reason they should get even less digestible after parching. For all these reasons the fibrous outer covering which remains adhering to *kheel* may be found irritating to the stomach of patients with a delicate digestion. As will be remembered, quite a large percentage of the total weight of *kheel* is, or is rendered, indigestible with saliva during parching. This possibly may set up the irritation which is alleged to follow its use. This tough covering is wanting in *murmura* which for this reason is not found irritating. This also is the reason for its containing a higher percentage of digestible carbohydrate material. If *kheel* were prepared from better kinds of rice, or with an improved method of parching which would remove its tough covering, it should be considered the most easily digestible of rice preparations, and could safely be recommended to patients with weak digestions in preference to even *parmal* which, in the meantime, should be considered a very desirable food for patients with weak digestions.

Why is parched grain so easily digested? I give the following reasons for this fact:—

(1) In parched rice the starch grains are completely exposed from their cellulose coverings and are lying completely outside as evidenced under the microscope.

(2) In *kheel* all the starch is converted into dextrin, an intermediate product of digestion of starch. In *parmal* also the greater part of the starch is converted into dextrin, and the remainder into soluble starch. This can be easily demonstrated by staining the granules with iodine and examining under the microscope. Parched rice thus gets a big start beforehand. This is not the case with boiled rice. There is a third factor also which, when present, should still further turn the scales in favour of parched grain and this is its dry nature. As mentioned previously, this provokes a large flow of active saliva and, on account of its containing in its meshes no water but only air, ferments should reach in no time to its deepest interior. This is not possible with boiled rice, where ferments not only will take much time to displace water, but will also be diluted by it. In my test-tube experiments this factor was not present as I had intentionally added water, for comparison was required between parched rice and boiled rice under exactly similar conditions. This factor, however, is prominently present in the mouth.

Similar experiments were carried out with other parched grains such as gram and maize, and in every case the starch contents were rendered much more rapidly digestible.

At the advice of Dr. Burrige to whom I am extremely grateful I carried on some feeding experiments on healthy people to see which of the two preparations of parched rice, *kheel* and *par-mal*, leaves the greater residue in fæces.

Before starting the experiments, the fæces of the subjects on whom feeding experiments were to be done were examined both macroscopically and microscopically. Their insoluble residues were identified, which consisted mostly of wheat bran and green vegetable and fruit fibres. They were then fed on *murmura* and *kheel* alternately and their fæces examined on subsequent days. Milk was allowed to them but no other food was given. During their feeds they were also made to swallow small muslin bags containing measured quantities of *kheel* and *par-mal*. The contents of the bags as they passed out were separately examined and the weights of the residue determined. The results were more or less uniform and confirmed my findings in the test-tube experiments. In every case a much larger and also coarser residue came out after feeding with *kheel*. In the case of *par-mal* the residue was much less and finer. None of the subjects' staple diet was rice. The residue after *par-mal* was much finer than the residue of wheat on their ordinary diet; but the residue of *kheel* was even coarser than that of wheat. In the case of *kheel* about 8 per cent. of the weight came out as insoluble fibrous matter, whereas it was only a little over 1 per cent. in the case of *par-mal*. This points to the superiority of *par-mal* over *kheel*, but if the latter were prepared from better grain and with improved technique this drawback should completely disappear, and *kheel* should be counted even better than *par-mal*.

These preparations should form a very good diet for the patient who is allowed only small quantities of easily digestible food at a time. These articles being very bulky only small quantities should be easily satisfying and filling.

SUMMARY.

1. Experiments have been carried out on the digestibility of rice and its different preparations in saliva.
2. Parched rice has been compared with boiled rice.
3. Parched rice has been shown to be an easily digestible food.
4. Of the two main preparations of parched rice, *kheel* is more easily digestible than *par-mal*, but contains a larger proportion of indigestible material which may cause some trouble if the digestive system is not properly working.
5. Other parched grains are also rendered easily digestible as far as their starch is concerned.

6. It is conjectured that protein is rendered less digestible after parching.

CONCLUSION.

Murmura is a good food for weak digestions more especially when prepared from better kinds of grain.

In conclusion I have again to tender my grateful thanks to Dr. Burrige for his invaluable advice, suggestions and criticism.

RADIOGRAPHY AS A HELP TO CORRECT DIAGNOSIS IN TRAUMATIC LESIONS.

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RADIOGRAPHY is a valuable aid to diagnosis, both positive and negative, by rendering visible invisible parts. It is especially useful to the general practitioner in the correct diagnosis of such traumatic lesions as fractures and dislocations. Such lesions may and often do exist where they are least suspected. On the other hand, they may not exist at all when strongly suspected. Fractures without crepitus, without obvious deformity or change in measurements, are not uncommon.

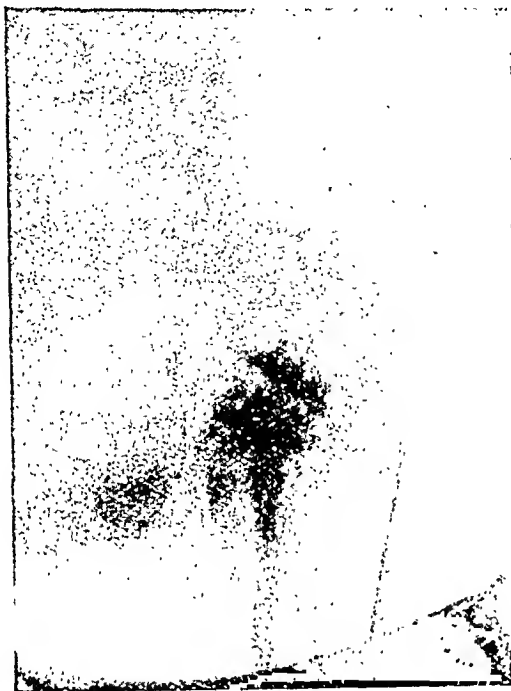
Four such confusing cases came to my notice within nine months out of a total of 89 cases of fractures and dislocations examined by X-rays. This works out at 3.37 per cent. Short notes of these cases with X-ray prints are as follows:—

No. I.



Case 1.—The patient, K. B., male, aged about 40 years, was admitted on 19th December, 1927, with a history of a fall from a height of about 15 feet and pain in his left ankle. Clinical examination showed no crepitus, no change in the length of the limb and no deformity. There was slight swelling on the medial aspect of the ankle-joint. Some trouble in the joint itself was suspected and he was sent for X-ray examination. This revealed fracture lines running through the calcaneus (*vide* Skiagram No. I).

No. II.



Case 2.—Patient, K. G., Hindu female, aged about 40 years, was admitted on 27th February, 1928,

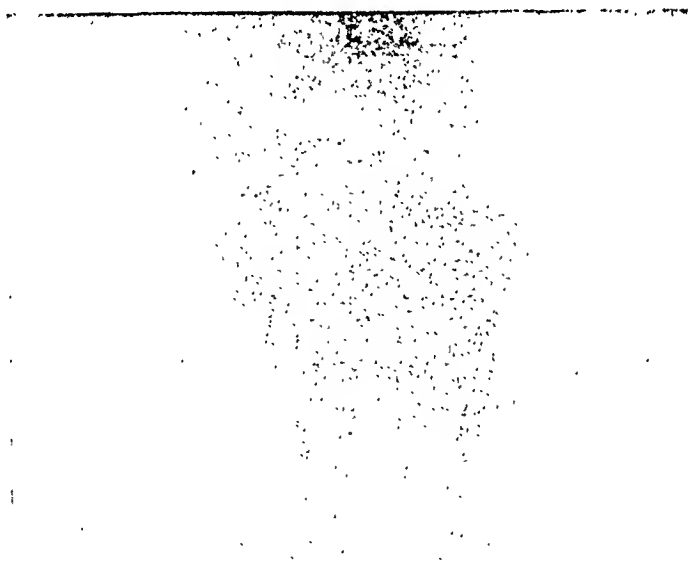
flexion and inversion—the patient being able to move about though complaining of pain. There was no swelling, but slight tenderness on the back of the thigh. Two possibilities were suggested:—dorsal dislocation of the hip-joint and sciatica. But X-ray examination disproved both and disclosed impacted fracture of the neck of the femur (*vide* Skiagram No. II).

Case 3.—This case is the reverse of the first two. About five months ago, a policeman was sent in with a history of injury in his right thumb and deformity highly suggestive of dislocation. Reduction under chloroform was decided upon after X-ray examination, when, to the surprise of all, the bones and joints were found normal.

Case 4.—Patient, a young man of 24, a football player, had a fall in a football match, but went on playing for about five minutes more and then retired from the field owing to intense pain in the knee (right). He was unable to walk for about a week and was treated as a case of sprained knee. After that he was limping about and sometimes rode a bicycle even. The pain, however, persisted. About three weeks after the injury he sought X-ray-aid and two fracture-lines in the upper end of the tibia (right) without displacement of fragments, and without deformity or change in the length of the limb were revealed (*vide* Skiagram No. III).

These cases point to the absolute necessity of X-ray examination, where facilities exist, as a routine method of diagnosis. It must be admitted, however, that such facilities exist in very few towns of India not to speak of villages where

No. III.



with a history of a fall about three weeks before, with pain in the left hip-joint. Clinical examination showed slight shortening ($\frac{1}{2}$ inch) of the limb with a little

even a microscope is a rare curiosity for miles around.

Indian Medical Gazette.

SEPTEMBER.

LIVER TREATMENT OF PERNICIOUS ANÆMIA.

THE study of tropical diseases is a comparatively young branch of Western medical science, it is, therefore, not surprising that almost yearly some definite advance is made in the treatment of these diseases. With diseases of the temperate zones, however, the position is different; the study of these diseases was placed on a scientific basis many years ago and, whenever new scientific methods have been introduced, they have been applied to the study of medicine. It cannot be said that during these years no stones have been left unturned, but certainly all the largest and most promising stones have been turned. It is to be expected, therefore, that dramatic discoveries, which place in the hands of the medical profession a means of treating a disease for which previously there was no treatment, or only very unsatisfactory treatment, are made only at long intervals. There are, of course, the "great discoveries" which are boomed in the public press but of which, after a month or so, one hears no more. There are the fads and fashions of medicine which run their natural course and either fade away or take a very humble place in the textbooks, but genuine advances are few and far between. In recent years, the discovery of insulin constitutes a definite advance in our knowledge of the treatment of disease. It is not suggested that with its introduction the problem of the treatment of diabetes was settled, but many diabetics have been cured who would otherwise not have been cured, and the lives of others have been prolonged and made comparatively comfortable as a consequence of this discovery.

The introduction of liver in the treatment of pernicious anæmia must, we think, be looked upon as a definite advance. Minot and Murphy, who are mainly responsible for the introduction of this treatment, published their first paper about two years ago. The treatment has been used by a very large number of the leading physicians in Britain, America and the Continent. Opinions as to its value appear to be unanimous. In almost every case of the disease in which sufficient liver or liver extract has been administered, a remission has been produced. It is at present too early to be dogmatic, but the general impression of those who have used this treatment is that in many instances complete cure has been effected and that, in the majority of cases, the symptoms are unlikely to recur provided the patient continues to live on a diet containing a certain amount of liver. Until two years ago, the main lines of treatment advocated were rest in bed, the

administration of arsenic, splenectomy and blood transfusion. The prognosis was always bad and the majority of the patients died in one to three years; some writers went as far as stating that if the patient did recover, it was because the diagnosis was wrong. The position is now reversed and recently it has been said that the reason for the failure of the liver treatment which has been reported in a small percentage of cases is due to a mistake in the diagnosis.

The diet advocated consists of plenty of lightly cooked red meat, from 4 to 8 ounces of liver, preferably mutton or beef liver, to be raw, lightly cooked or even made into soup, but prolonged boiling should be avoided, plenty of fresh green vegetables and as much fruit as possible; fats should be avoided, so that only a limited supply of milk and butter is allowed. Tea and coffee may be taken and a reasonable amount of sugar. The carbohydrate intake is not limited provided it does not interfere with the consumption of the prescribed amount of proteins.

The essential part of this diet appears to be the liver. Recent work has shown that a water-soluble extract of liver is as efficacious as the liver itself, and the extract has the definite advantage that it can be taken in much larger quantities. In many cases no other form of treatment is necessary, but where there is any definite focus of infection, as for example in the intestinal tract, treatment for this should also be given, and in the majority of cases it is advisable to give hydrochloric acid. In cases that first come under treatment in an advanced stage of the disease, it may be necessary to give a blood transfusion in order to improve the patient's condition sufficiently for him to digest the necessary amount of liver.

Pernicious anæmia is universally recognised as a definite clinical syndrome with more or less constant pathological changes, but the ætiology of the disease is not known and it is usually admitted that it is not a constant factor. Malaria, sprue, hookworm disease and *Bothriocephalus latus* infection are said to be amongst the ætiological factors. Achlorhydria is a constant factor and this is usually associated with intestinal sepsis. One school considers that the disease is due to an inherent defect in the blood-forming organs, whereas another considers that it is due to general septic absorption from the bowel, or to poisoning by some specific organism, such as *B. welchii*. It is interesting, and almost amusing, that this latest advance is a treatment which is in no way dependent on new scientific methods, but consists in the regular consumption of an article of diet which has always been in common use amongst meat-eating races.

Now one of the most interesting points about the disease is that although the ætiological factor is not a constant one, the response to liver treatment appears to be constant and the one condition always associated with the disease and looked upon as a possible predisposing cause, namely, achlorhydria, is unaffected by the treatment. It seems likely that the treatment does not strike at

the root cause of the condition but inhibits blood destruction and, to a less extent, stimulates blood formation. So far the treatment has not proved successful in secondary anæmias or anæmias of the chlorotic type in Europe and America, but, nevertheless, these are possibilities for its wider application, especially in India where anæmia, much of which is of the pernicious type, is such a very common condition. The anæmia frequently disappears when the primary infection, malaria, hookworm, kala-azar, etc., is eradicated, but very frequently the patient remains in a weak anæmic condition for months and even years; in other instances the patient is so anæmic that it is impossible to give the full course of the treatment necessary to eradicate the primary infection. There are also many examples of anæmia with enlargement of the spleen of which the ætiology is doubtful. It will be extremely interesting to see the effect of the liver treatment in these conditions.

The orthodox Hindu would naturally be averse to this treatment in any form, and even the unorthodox would probably object to ingesting large quantities of beef liver, but this is not necessary; there is other liver which is almost equally efficacious. Furthermore, the extract of which there are many brands on the market, can be prescribed and taken by the patient in the form of a medicine.

A Mirror of Hospital Practice.

A CASE OF CONGENITAL STENOSIS OF THE PYLORUS TREATED BY RAMMSTEDT'S OPERATION.

By S. A. McSWINEY, M.B., D.Ch., F.R.C.S.I.,

MAJOR, I.M.S.,

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CONGENITAL stenosis of the pylorus, although comparatively common in certain hospitals in England, is so uncommon in India that the following case seems worth recording: it is remarkable for the early onset and acuteness of the disease.

V. C. H., aged two weeks, European male child, was admitted on 1st July, 1926, to the children's ward of which I was then in charge, in the Presidency General Hospital, Calcutta.

The mother stated that the child had been vomiting for the past four days and that it was very constipated. The weight at birth had been 6½ lbs. It had been bottle-fed from the beginning. On admission it weighed 5¾ lbs., otherwise ordinary physical examination was negative.

The combination of vomiting with constipation in a baby a few weeks old—especially a male baby—was so suggestive of congenital stenosis of the pylorus that when I saw the baby on the morning of the 2nd July, I decided to investigate it.

Visible peristalsis was seen without difficulty. (To elicit visible peristalsis, it is necessary to

have the baby fed and then examine it at once in a good light, when the waves will be seen passing from left to right in the epigastrium.) A little later the child vomited in my presence: the character was projectile, the contents being ejected 18 inches to two feet from the lips.

I was unable to satisfy myself as to the presence of the last sign, i.e., the presence of a tumour in the pyloric region.

Treatment by gastric lavage and small hourly feeds was tried for two days, the only result of which was a further loss in weight of 6 ozs.—making a total loss of 14 ozs. since birth. The vomiting was unaffected and the child was beginning to look very ill. It was, therefore, decided to do Rammstedt's operation, which consists in dividing the muscular coat of the pylorus down to the mucous membrane.

The operation was done on 5th July, 1926, and the diagnosis was confirmed. The baby took the anæsthetic (A. C. E.) very badly. The mucous membrane of the duodenum was accidentally opened. It was closed by four catgut sutures. There was profound shock after the operation and, during the following three days, the temperature reached 103° or 104°.

Vomiting ceased the day after the operation and, with the exception of some suppuration in the wound, recovery was steady. The after-treatment is of the greatest importance. It consists of very small frequent feeds which are begun almost at once; the amount is increased daily and given at gradually increasing intervals. He was discharged from hospital on 31st August, by which time his weight had increased by 24 ozs.

The child was brought to me again on 2nd July, 1928, i.e., two years later. He has had no trouble since the operation except ordinary minor ailments.

While attending Great Ormond Street Hospital for sick children in 1927, I was struck by the frequency with which congenital stenosis of the pylorus is met with there. They have practically abandoned every treatment except Rammstedt's operation. I learnt from the various members of the staff that:—

1. The mortality has been greatly reduced since they adopted gas and oxygen as the anæsthetic.

2. Opening the mucous membrane of the duodenum is not an uncommon accident, but is not of very great importance so long as it is recognised and sewn up again. This danger can be greatly lessened by using a blunt dissector to increase and deepen the incision over the pylorus until the mucous membrane is seen to bulge into the wound.

3. Hyperpyrexia used to give trouble until they reduced to a minimum the use of hot-bottles after the operation.

I should like to thank Lt.-Col. A. H. Proctor, I.M.S., and Major H. G. Alexander, I.M.S., for the assistance they gave me in dealing with the case.

A CASE OF INFANTILE SCURVY.

By S. A. McSWINEY, M.B., B.Ch., F.R.C.S.I.,
MAJOR, I.M.S.,

Officiating Second Professor of Midwifery, Medical College, Calcutta and Second Surgeon, Eden Hospital, Calcutta.

THE following case, which was admitted into the children's ward of the Presidency General Hospital when I was Resident Surgeon there, is of interest for the reason that the child was originally breast-fed and also that subsequently twelve months elapsed on diet sadly deficient in vitamin "C" before the symptoms appeared.

E. A., aged 1 year and 3 months, Anglo-Indian, female, was admitted on 16th December, 1925.

Feeding history.—Breast-fed for three months; boiled cow's milk and water for the next nine months; boiled cow's milk and *suji* for the last three months. Fruit juice was said to have been given about once a month! There were hæmorrhages into the left eyelid and gums and a firm tender swelling over the lower third of the left femur. The child screamed if it was handled or expected to be handled, i.e., if one turned back the bed clothes.

Diagnosis.—Infantile scurvy. X-ray of the left femur showed an extensive subperiosteal hæmorrhage in the lower third.

Treatment consisted of fruit juice, "potato-cream" and cod-liver oil. By the 10th of January, the child was the most happy smiling child in the ward. The hæmorrhages had disappeared from the eyelid and gums and the swelling on the femur was very much less. When she was about to be discharged she contracted measles, but her further recovery was uneventful.

STONE IN THE BLADDER.

By S. Y. SHAIKH, L.C.P.S.,

Second Assistant, Civil Hospital, Nasik.

A MAN, aged 30, was admitted into this hospital on 24th March, 1928, for stone in the bladder. On 26th March, 1928, he was anaesthetised for litholapaxy. In trying to crush the stone I felt a few pieces of some soft material in the bladder. I caught one in the lithotrite and pulled it out. It was a piece of stick $6\frac{3}{4}$ inches long. Two other pieces were removed, one of them having some phosphatic deposit on it. The patient passed his urine quite comfortably the next day and was discharged on 28th March, 1928. On enquiry he told me that he pushed the stick in 3 months before when he could not pass his urine. The stick broke and in trying to get the broken piece out he lost two more bits of the stick which was a kind of reed. I have to thank Major Shah, I.M.S., Civil Surgeon, Nasik, for allowing me to do the operation and for permitting me to publish this note.

AN INTERESTING CASE OF STRANGULATED HERNIA.

By PROSAD GUPTA, L.M.P.,

Medical Officer In-Charge, Mallawan Dispensary, District Hardoi, U. P.

PANDIT, S. N., an old man of 80 years, had been suffering from left reducible inguinal hernia for about the last 25 years. One evening, while he was recovering from an acute attack of capillary bronchitis, I was called in to see him, as, all of a sudden, while defæcating, he got an excruciating pain over the left inguinal region with a mango-like tumour in the scrotum. I tried to reduce it by taxis, but failed in my attempts. I then explained to the patient and the relatives the nature of the disease and advised them to take him immediately to Sadar Hospital, Hardoi, or to the Medical College Hospital, Lucknow, for operation telling them that any delay on their part would make the case more hopeless. He took no notice of my advice and began Ayurvedic treatment.

After about 4 days I was again called in to see him, when I found his condition very grave with pain, bilious vomiting, hiccough, very weak, slow and intermittent pulse and marked emaciation. He was quite unfit to be taken out anywhere. His relatives told me to do whatever was possible for him in their place as they had lost every hope for his life and he was unfit for removal. I, immediately, on 5th September, 1927, put him under chloroform and ether anaesthesia and performed Bassini's operation under whatever aseptic precautions I could take in a poorly-equipped outlying dispensary. On cutting the strangulation the bowels were found cynosed and sanguinous fluid escaped. As gangrene had not actually set in, I returned the gut into the abdomen and sutured the wound putting a small rubber tube for drainage, which was removed later on.

The patient made an uneventful recovery except suppuration of 2 or 3 stitches and was discharged cured on 10th October, 1927.

After about a month I was again called to see him, when I found him suffering from excruciating pain just beneath the liver with a very tense abdominal wall. As I was just then going to the Sadar to give evidence in a medico-legal case, I advised the patient to accompany me for the civil surgeon's advice; they said they would bring him the next day, as they could not be ready in a minute.

On my coming back in the evening I heard that everything had subsided after a Vaid's local application. Just after the application he had very severe vomiting followed by complete recovery. I then told them that this must be nothing but a kinking of the gut somewhere inside the abdomen, which was reduced during the fit of vomiting. After about 3 or 4 weeks I was again called in to

see him for the same pain, but this time it was after they had tried the same Vaid's "lep" without any relief. As his abdominal wall over the site of the pain was very tense, I examined him under general anæsthesia. I could palpate an orange-like swelling and, while I was moving it to and fro for the sake of diagnosis, to my great astonishment the whole thing disappeared suddenly with a gurgling sound and the patient on coming round found that he had no pain at all.

This must have been a strangulated hernia somewhere inside the abdomen, probably through the foramen of Winslow. For about 5 months now he has been free from any further attack.

VOLVULUS OF THE SMALL INTESTINE.

By CAPTAIN R. P. GHOSH, M.B.,

Teacher of Surgery, Darbhanga Medical School,
Laheriasarai.

Volvulus of the small intestine is believed to be a rare condition—yet this forms the majority of the cases of intestinal obstruction which come to Laheriasarai hospital—the average of the volvulus cases being about a dozen a year. We have found practically the whole of the small intestine, both jejunum and ileum rotated, some cases having one twist only and others two. In almost every case we get a history of the abdomen having been massaged either by the fist or the heel being placed on the navel and then swung round; this method is supposed to be a cure for stomach ache which is described by the local Vaidas as "displacement of the bowels." During operation we have never found any adhesions fixing the gut and all that we do is to untwist the bowels, and let the colon fall into place. When the sigmoid becomes distended we put in a long rectal tube, guiding it to the pelvic colon with one hand inside the abdomen, and expel a good quantity of the intestinal contents through the tube. Although this process takes time, we prefer it to opening a loop of intestine. Shortly after the operation we give the patient pituitrin 1 c.c. and eserine gr. 1-100, hypodermically, and we repeat this every four hours until a satisfactory condition of the bowels is obtained. The result of this form of treatment has been very satisfactory; the recovery rate is almost 75 per cent.

My grateful thanks are due to my chief, Dr. S. M. Liversey, M.B., F.R.C.S., whose large practical experience of the treatment of such cases has been of great assistance to me.

A SECOND CASE OF MADURA FOOT TREATED BY CHEMOTHERAPY WITH APPARENT CURE.

By F. J. PALMER, F.R.C.S.I.,

LIEUTENANT-COLONEL, R.A.M.C. (Retd.),

Binnakandy, P. O. Silchar, Cachar, Assam.

In the *Indian Medical Gazette* of February 1926, the writer reported what he then considered

to be the first case of Madura foot successfully treated by chemotherapy. In a letter to the same journal in June 1926 Balfour pointed out that Audrain had reported a case as cured in the *Journal of the American Medical Association* for 14th October, 1924. The drugs used in Audrain's case had been neo-arsphenamin, and mercurochrome 220 soluble.

In a short paper on "Mycetoma" in the *Indian Medical Gazette* of November 1927 by Bradfield and Vasudevan, the former writer is of opinion that drugs "smile but to deceive," and that early diagnosis and non-mutilative operation is still the best to be hoped for.

With this conclusion the writer cannot agree, as the following case will show.

H—, a villager, was first seen on 23rd August, 1926. He then exhibited a typical mycetomatous infiltration of the right leg and heel, discharging freely from numerous pouting sinuses, and with a similar lesion, ulcerating slightly, on the palmar surface of the forearm above the right wrist. The first photograph shows the leg with fungating sinuses at this time.

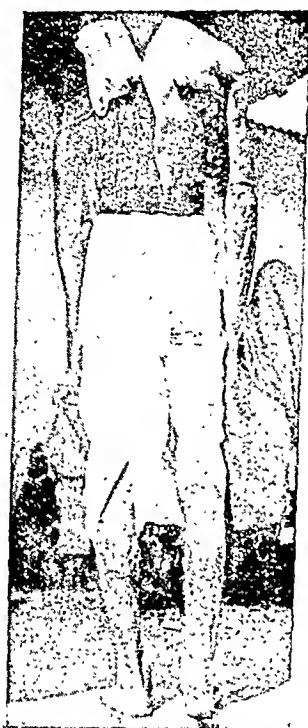


Before treatment with numerous discharging sinuses.

I determined to give a thorough trial to oral medication in this case, and selected for trial two drugs, zinc and copper citrate, which, in my hands, have produced good results in the treatment of several cases of leprosy, both producing reactions after oral administration with a minimum of trouble and discomfort.

Treatment was begun with 1 gr. of zinc citrate, twice daily for 14 days. The drug was then stopped for 10 days, and, at the end of that period, copper citrate given for another 14 days, with a ten-day intermission; after which the zinc salt was resumed. This treatment was persevered in for several months with marked improvement; most of the sinuses closing up, and the

lesion above the wrist being reduced to a barely perceptible induration.



After treatment with depressed pits where the sinuses had existed.

At the time when it looked as if treatment might be successful, the man absented himself for two months owing, as he stated, to an attack of dysentery, and when next seen it looked as if a drug-fast parasite might be developing. After a further trial of zinc and copper, it was recognised that the disease was advancing in spite of treatment, fresh ulcerating nodules appeared higher up the leg, and the indurations above the wrist increased and began to discharge.

Intravenous medication was then resorted to:—

31st October, 1927.—Gr. 2 Bismuth tartrate, intravenously.

9th November, 1927.—Much improved. No albumen. Gr. 3 Bismuth tartrate. I.V.

14th November, 1927.—Wrist all dried up and much less swollen, as is foot. No albumen. Last new centres of disease much shrunken, and some near heel closed.

28th November, 1927.—Improvement continued. No albumen. Gr. 3 Bismuth tartrate, intravenously.

6th December, 1927.—All new centres dried up. Gr. 3½ Bismuth tartrate. I.V.

12th December, 1927.—All healed. Leg slimmer. Gr. 1 Copper citrate, and Gr. 3 Sodium citrate. I.V.

No further treatment was given.

The photographs show the condition before and after treatment. For the second photograph the patient walked in 10 miles, and out again after it had been taken.

All sinuses healed. Foot much slimmer.

No induration above wrist or in spots where new foci had formed.

30th April, 1928.—Though patient has had no treatment for over four months, there is no sign of recrudescence.

22nd July, 1928.—Patient reported for inspection. No sign of recurrence so far.

One can only speak of apparent cure, as it is not yet certain that all foci are destroyed. Even if this is not the case, the effect of treatment has been so marked after a few doses intravenously, that it is not at all likely that a drug-fast parasite has developed, and there is every reason to believe that, should relapse occur, a further course of more intensive treatment on these lines, would produce a more permanent effect.

This case, I think, shows:—

- (1) That though zinc and copper orally produced marked improvement, the action is not pronounced enough to lead to cure.
- (2) The superiority of the intravenous route.
- (3) The almost specific action of bismuth tartrate.

Only one dose of copper was given intravenously.

A CASE OF AURICULAR FIBRILLATION AFTER ASPIRIN.

By A. K. DUTT GUPTA, M.B., D.T.M. (Bengal),
Assistant Surgeon, Presidency General Hospital.

SOME people are said to be very intolerant to aspirin and similar preparations. The symptoms usually noticed according to standard books on pharmacology are dyspnoea, a condition of collapse with slow weak pulse and subnormal temperature, cyanosis, rash, and giddiness. The production of auricular fibrillation after its administration, in an apparently healthy heart, appears to be rare. The following case might, therefore, be of interest:—

E. M., aged about 50 years, was admitted with a history of low intermittent fever for 10 days, and high continuous fever with severe pain in the head, back and eyes for 2 days. Before admission he was doing ordinary office work regularly.

He gave a history of suffering from chronic bronchitis off and on for the last two years. His habits were sedentary. He took alcohol, about 6 peps a day, and cigarettes, 30 a day.

He had recently been examined by certain eminent physicians who had never found any cardiac derangement or impairment.

Before admission he had taken some caffeine for pain; this had caused excessive sweating.

On admission the temperature was fairly high, the pulse rate and respiration rate being consistent with it.

Systemic physical examination revealed only a slight emphysematous condition of the chest and harsh breath sounds. The heart was normal in size and regular.

He was put on to aspirin (Pulv. A. P. C.) 5 grains three times a day for the pain; after each dose he perspired excessively and felt bad.

Next day he had taken only 5 grains when he felt very bad. The pulse was weak and very irregular; auricular fibrillation had set in. Aspirin was stopped. Brandy 2 oz. in divided doses was given to combat the collapsed condition.

On the third day after admission the temperature came down to normal but the pulse, though stronger, was still very irregular.

On the fourth day, he was put on to full doses of digitalis and in two days time the pulse was regular again and the patient made an uneventful recovery.

The blood pressure was normal during the attack.

There was nothing in the pathological findings to suggest cardiac degeneration.

My grateful thanks are due to Major Murray, I.M.S., under whose care the patient was, for permission to publish these notes.

A FOREIGN BODY IN THE GLUTEAL REGION.

By JOGENDRA NATH PAUL, M.B.,
House Surgeon, Mayo Hospital, Surgeon-Superintendent's Ward, Calcutta.

THE following case is, I think, a sufficiently uncommon occurrence to warrant its publication.

Hindu female, aged 25, was admitted to hospital on 15th June, 1928, for a gluteal abscess on the left side.

On examination, the left nates was found to be inflamed. It was hard and brawny with very little fluctuation, but intensely tender. The abscess was pointing just above the ischial tuberosity. The patient's temperature was normal and there was no other trouble. The duration of the present complaint was one month.

Next day the abscess was opened under general anaesthesia, an incision being made over the most tender spot, but no pus was found. The incision was deepened but there was still no pus. A finger was then passed within the abscess cavity; this met with no resistance, but at a depth of about 2 inches it touched something hard which was freely moveable. The original incision was now prolonged and with a pair of pressure forceps a slender stem of a plant, 6 inches long, devoid of its bark and with marks of insertion of leaves at frequent intervals was withdrawn.

When she came round, the patient absolutely denied any knowledge as to how the stem got in. External mark of any injury was not to be found anywhere. Suspecting strongly that it had been an agent to relieve a gravid uterus, a vaginal examination was made. The following was the condition:—

Uterus retroverted, somewhat enlarged soft cervix, swollen lips admitted the tip of a finger. Slight seropurulent discharge was running out.

Culs clear, no thickening anywhere, on the posterior part of lateral vaginal wall on the left side a lacerated wound was discovered which was

raw and admitted the tip of a probe. The wound, however, was perfectly clean.

This discovery enabled me to put more direct questions to the patient. She then confessed to having passed this stick in order to get rid of the undesirable content of her uterus which had been worrying her for the last three months. Though the shot went wide—the game was nevertheless brought down and on the second day of her passing the stick evacuation of the uterus took place. The patient said she had a rise of temperature at the time and for seven subsequent days. Judging from the points of entry and of exit of the stick, it is conjectured that the stick must have been passed with some violence through the lateral vaginal wall (narrowly missing the pouch of Douglas) into the pelvis and through the great sciatic notch it had passed into the gluteal muscle and thence was trying to find a way out through the nates.

Hot vaginal douche with tincture of iodine, twice daily, was ordered; the patient made an uneventful recovery and was discharged cured on 1st July, 1928.

The following facts in this case are noteworthy and interesting:

1. The stick, though it missed the cervix, carried out its mission successfully.
2. The abnormal and tortuous course taken by the stick.
3. Perfect aseptic condition of the wound and of the whole tract it had traversed.

My thanks are due to our Resident Surgeon, Dr. S. C. Dutt, for his valuable suggestions as to the probable course taken by the stick and to our Surgeon-Superintendent, Major E. W. O'G. Kirwan, I.M.S., for his kind permission to publish this case.

SYMPTOMS SIMULATING CHOLERA, POSSIBLY CAUSED BY ROUND-WORM INFECTIONS.

By RASIK BEHARI LAL, L.M.P., P.S.M.S.,
*Medical Officer, Cholera Duty,
District Gorakhpore, U. P.*

I HAD the opportunity of visiting a village which was infected with cholera. There had been 4 deaths, including three children under four years of age. At the time of my visit I saw two females and one male child, four years of age, who were suffering from choleraic symptoms.

As I am at present concerned with only one case, that of the boy mentioned above, I will describe his symptoms in detail. The history of the boy, aged 4, was as follows:—

He had been suffering for 36 hours at the time I saw him with frequent motions and vomiting, marked thirst, and any water or food which was given to him was ejected immediately. He also complained of pain in the abdomen. The temperature was 99°F., pulse 140 per minute, very feeble and sometimes imperceptible, face anxious, eyes much sunken, and tongue quite clean. The boy was very restless, which gave one the idea that

he was having cramps. After a series of questions I found out that the motions were not watery and white, but were greenish and contained some mucus. The patient was put on essential oils mixture, 5ii every hour, this being the only available remedy on the spot, and the relatives were advised to give him nothing but permanganated water.

Next day when I saw the patient again, after 20 hours, during which time he had had 10 doses of the mixture, I found him no better. Vomiting and diarrhoea showed the same frequency, but the pulse was somewhat stronger and more regular. The relatives, who were very anxious about the child, told me that the child had passed a roundworm in one of his vomits.

As I had no santonine and I tried in vain to find pomegranate-bark, I had to be contented with gr. ii of calomel, which I gave in a single dose. After a few hours the child passed 2 motions, expelling 2 worms and his condition rapidly improved; vomiting ceased and by the third day the boy was quite well except for a little weakness. After calomel he was given no other medicine.

QUININE INTOLERANCE.

By BINODE KRISHNA BANERJI, M.B.,
S. C. Coomar Charitable Dispensary,
Chanditala (Hughli).

Case No. 1.—Patient, a younger brother of the writer, aged 30 years, had been suffering from frequent attacks of high fever of the malarial type, i.e., fever with rigors, temperature 104° to 105° , with bilious vomiting and profuse perspiration during remission, and coming regularly on alternate days. Blood examination showed a benign-tertian infection.

Patient has a history of anaphylactic symptoms for the last five years whenever a small dose of quinine is administered. He complains of creeping sensation in the fingers and toes, which gradually extends to the palm and the sole, and finally the whole part becomes slightly oedematous. At the same time he complains of acute pain in the abdomen and restlessness with profuse sweating. The sensation diminishes on the application of hot-water bottles. These symptoms generally last for 3 to 4 hours after the administration of the drug.

Quinine, cinchona, euquinine and aristochin have been tried without his knowledge even in gr. $\frac{1}{4}$ doses but have always been followed by the symptoms stated above. The fever persisted regularly and the spleen enlarged to $2\frac{1}{2}$ inches. He was being given injections of soamin and on one occasion 5 grains of quinine bi-hydrochloride has been tried intramuscularly without his knowledge (he was given to understand that it was nothing but the usual injection of soamin) and he at once developed those symptoms which lasted for nearly 8 hours during which the patient was in great agony.

Ultimately cinchona febrifuge was given in $\frac{1}{8}$ grain doses two and half hours after food—4 times a day and he tolerated some of the doses well.

From $\frac{1}{8}$ grain he began to tolerate $\frac{1}{4}$ grain— $\frac{1}{2}$ grain, $\frac{3}{4}$ grain and 1 gr. and gradually the drug was pushed up to $2\frac{1}{2}$ grains per dose. He took three doses of the above strength regularly for six months and got rid of the fever.

Case No. 2.—A lady, 25 years, had developed an attack of malarial fever almost of the same type as the first case. The anaphylactic symptoms in this case are as follows:—a few minutes after the administration of the smallest dose of quinine, cinchona, euquinine, etc., she complains of a feeling of warmth all over the body—the face becomes flushed and the whole body slightly red in colour; later an urticarial rash appears all over the body. The patient always wraps herself up with a piece of wet cloth with the onset of the symptoms which generally disappear in the course of 2 to 3 hours.

She was also given cinchona in gr. $\frac{1}{8}$ doses and ultimately tolerated $2\frac{1}{2}$ grains per dose—4 times a day.

In both these cases the malaria was of benign-tertian type.

Current Topics.

A Method of Treating Fractures of the Clavicle with Displacement.

By G. W. MILROY, M.B., Ch.B.
(*Brit. Med. Journ.*, April 21, 1928, p. 664.)

PROBABLY the most commonly used method of treating simple fractures of the clavicle with displacement is either that originally described by Sayre, or the bandage devised by Douglas. One great disadvantage of the former method of fixation is the fact that the strapping used to support the elbow so often slips over the point of the olecranon process, allowing the arm to drop, with recurrence of the original displacement.

In an endeavour to avoid this difficulty the plaster is sometimes applied with the adhesive side next to the skin. This certainly prevents any slipping, but it does not allow of accurate adjustment, and also gives rise to much discomfort, often amounting to actual pain, particularly around the point of the elbow. This pain seems to be equally severe whether a slit for the olecranon process is made in the plaster or not. If, on the other hand, Douglas's method of bandaging is employed, the original disadvantage is again evident. The bandage as a whole tends to become loose, and the final turns round the elbow and over the opposite shoulder slip off the elbow and allow the arm to drop. The bandage may remain in good position during the day, but when the patient is in bed, and particularly if he is somewhat restless, as these patients usually are, the bandage will soon work loose. It is a common experience to find a patient with a fractured clavicle, which has been reduced and firmly bandaged on one day, returning next morning with the bandage loose and the deformity renewed.

To overcome these difficulties I have been using a modification of Sayre's method which has given great satisfaction. The method devised is as follows:

Two five-foot lengths of calico bandage are required. The first, as in Sayre's original method, is looped loosely

round the affected arm as high up as possible, the loop being fastened with a safety-pin. The usual pad is placed in the axilla, the shoulder is pulled back as far as possible, and the bandage is carried across the back of the trunk, round across the chest, and pinned to itself just beyond the loop round the arm.

The second bandage, which should be at least six inches wide, is slit from one end for a little less than half its length, and is then applied to the injured arm in the form of a sling, with the two tails to the front, in the following manner. The uncut end of the bandage runs from the unaffected shoulder across the back to the elbow of the affected arm, which it supports, a pad of wool being placed between it and the olecranon. The bandage is adjusted in such a way that the two tails originate an inch or so in front of the point of the elbow. These tails are then carried round opposite sides of the forearm, and are twisted together once or twice as near to the bend of the elbow as is possible. They are then carried forward as spirals in opposite directions round the forearm, thus crossing on the dorsal aspect of the middle of the forearm, and also at the front of the wrist, where they are again twisted together and carried on as one to the shoulder. The elbow is then drawn upwards, forwards, and inwards to the required position, and secured by tying the ends of the "sling" over the unaffected shoulder. The sling effect of the second bandage has been found to be very stable; the first loop of the tails round the forearm just beyond the elbow effectively prevents any slipping off the elbow.

The spiral round the forearm will be found to support the forearm comfortably in the usual position across the chest, and the combination of the two bandages and the axillary pad will supply the forces necessary to carry the lateral fragment of the clavicle upwards, backwards, and laterally, which is so essential for a perfect result in these cases.

The Value of Bismuth Therapy in Syphilis.

By C. LEVADITI

and

L. FOURNIER.

(*Lancet*, April 7, 1928, p. 692.)

THESE authors arrive at the following conclusions:—

(1) Bismuth-stovarsol administered by mouth, whether in solution or in the solid form, is perfectly well tolerated in doses of 2 g. daily for a period of 8–11 days. Even with this very considerable dosage, corresponding to 0.82 g. of Bi. and 0.3 g. As. per day, we have never observed any digestive or other disturbance worthy of note, with the exception of two cases, in which a generalised erythema appeared but quickly subsided.

(2) Cases of primary and secondary syphilis, in which the serological reactions were strongly positive and spirochaetes were demonstrably present, have shown rapid disappearance of the spirochaetes and prompt cicatisation of the lesions. The rash has disappeared in from 10–12 days, and the lesions have been cured in about 13 days.

(3) Under the influence of the treatment, exclusively by the mouth, the serological reactions become more or less rapidly negative whatever the reaction employed (Bauer-Hecht, Wassermann, Calmette-Massol, or Vernes' flocculation reaction). In certain cases they remained negative for a long period without any further treatment.

Admittedly our cases are few, and the time is too short to permit us to judge definitely of the therapeutic value of bismuth-stovarsol administered by mouth. Nevertheless, it is not going too far to suggest, from the actual clinical records, the usefulness of this method of treatment in all syphilitic cases where treatment by injection is contra-indicated, or where it is necessary to employ a method of treatment which is convenient and well tolerated by the patient.

Chemotherapy.*

By PROFESSOR BERNARDT NOCHT.

(*Trans. Roy. Soc. Trop. Med. and Hyg.*,

Vol. XXI, No. 5, Feb. 1928, p. 397.)

THERAPEUTIC science and therapeutical measures in general are based on two principles. We distinguish between symptomatic and ætiologic therapy. Symptomatic therapy is older and more used in general practice; causal therapy is of a more recent date, although already physicians in the past, Paracelsus for instance, designated as the principal aim of therapy the finding of "Arcana"—curatives against the causes of disease, not against its symptoms. But the beginning of real efficacious ætiologic therapy is of most recent date. Causal therapy is a child of bacteriology and general microbiology. We know now a great many sera and vaccines against infectious diseases and we are using them on a large scale as prophylactic and therapeutic agents against many infectious disease. But we are not able to apply this vaccinotherapy and serumtherapy against all infectious diseases, since there are many without a satisfying and applicable production of protecting sera and vaccines.

Particularly do protozoal infections belong to this category, and we would remain in a very awkward position regarding the therapy of and the campaign against these diseases if chemotherapy had not been invented. Its inventor is Paul Ehrlich.

Chemotherapy is not a general therapy with synthetic chemicals in contrast to therapy with pharmaceutical products derived from minerals, plants, or animals, and offered by nature. General therapy with artificially produced chemicals is of very old date; mercury, bismuth, and arsenical and antimonial compounds have been used for centuries in symptomatic therapy. But there is fundamentally no difference between long used chemicals of this kind and modern compounds like antipyrin, aspirin, soporific and hypnotic modern drugs, etc. They have been, and still are, employed against symptoms, not against the causes of the diseases. *Chemotherapy is ætiologic therapy with synthetic chemicals.* In regard to its end effect chemotherapy may also be called "internal disinfection," but this characterisation can only be applied to chemotherapeutic agents which have a direct bactericidal action in the body. But in most cases the action of chemotherapeutic bodies is not directly bactericidal, but is of a rather complicated nature. Further, there exists, of course, a great difference between external and internal disinfection. In external disinfection the chemical compounds at our disposal exercise without exception a general poisoning action against living matter, be it as micro-organisms or as living cells of the body or of any other kind. The aim of internal disinfection is the finding of compounds which may act in the body in a specific elective manner, so that they cause as little injury as possible to the cells and tissues of the body and act as a poison only against the pathogenic microbes in the body. With Ehrlich we have to distinguish between organotropy and parasitotropy in dealing with chemicals introduced into the infected body. The ratio between the organotropic and the parasitotropic action of a chemotherapeutic substance is called its "therapeutic index" or "therapeutic ratio." The greater the difference between organotropic and parasitotropic efficacy, the greater the therapeutic ratio and the better the remedy. The ideal aim is to find compounds without any action on the body combined with a prompt parasitocidal effect.

The Theory of Chemotherapy.

Chemotherapeutic substances are, in general, compounds of a rather complicated structure, with one or several nuclei and side chains amongst which Ehrlich

*Lecture given at the International Continuation Course in Public Health, 28th November, 1927.—*League of Nations*.

distinguished haptophoric and toxophoric groups. The haptophoric groups attach themselves by chemical affinity to certain groups in the parasites, Ehrlich's chemoreceptors; once attached, they bring the toxophoric groups also into action in the parasites.

This theory has proved very fertile, it has had a great heuristic value; but the number of chemotherapeutic agents really acting in this manner seems to be rather limited. It is very probable that some arsenicals (such as salvarsan and its derivatives, antimony compounds, and "Bayer 205") may directly damage certain microorganisms in the body, but on the whole the question is not yet settled. Recently investigators have observed that salvarsan, for instance, after being absorbed by erythrocytes or other cells has a better action on spirochaetes than usual. Therefore it seems probable that, at least within certain limits, there does not exist an antagonism in this case between organotropic and parasitotropic action. Besides, we can observe only in exceptional cases a really direct bactericidal or parasitocidal action of chemotherapeutic agents. In most cases they only damage the parasites, they are *parasitotoxic* not *parasiticidal*, impairing the motility or prohibiting division and multiplication of the parasites. The final death of these is due to the action of the infected body itself. Therefore *therapia magna sterilisans* is still an ideal aim not yet arrived at.

Parasitotoxic action is greatly enhanced by a combined use of different chemotherapeutic substances, which attack the parasites at the same time from different points. So, in many cases of syphilis, a combination of salvarsan with bismuth or hydrargyrum has proved very efficacious. As for malaria, quinine plus stovarsol has a very good effect in subtertian infection. The same applies to plasmochinum compositum, that is, plasmochin plus quinine in subtertian malaria.

The mechanism of the action of quinine in malaria is not yet completely clear. The observation that malarial infection may be obtained by injecting blood containing malaria parasites—but having been in contact with quinine outside the body in a concentration of 1/5000 for some hours—seems to be in contradiction to the theory of a direct action of quinine on malaria parasites. This has to be stated, although there have been put forward explanations of this phenomenon which are still in compliance with the theory of a direct action of quinine on malaria parasites. But in any event it is proven that quinine has a much greater effect in malaria when the patients have, to a certain degree, already developed some self-immunising power. It is true that the degree of self-immunisation which can be obtained in malaria is not strong enough to cure the patient thoroughly; but the effect of quinine is much better when administered after a certain number of attacks of fever, which implies a development of a certain degree of self-immunisation. This fact can be of practical value in the treatment of tertian fever, but in subtertian fever it would be rather dangerous to postpone the quinine treatment until after several attacks of fever, since any attack may cause the death of the patient. On the other side, it is well known that the resistant forces of the body, produced by the first series of febrile attacks, are very easily destroyed by injuries like chills or wetting by rain, by over-exertion, by faults in diet, alcoholic excesses, etc. These influences, almost regularly, cause re-appearance of fevers and relapses in infected persons. But it is not sufficiently known that quinine also can be a cause of the re-appearance of fever and of parasites in the blood. Quinine, when taken daily during weeks and months in rather large doses, very often ends in a chronic quinine intoxication, by which the powers of resistance of the body against recrudescence of the malarial infection are destroyed. Many so-called quinine resistant cases of malaria are due to chronic quinine intoxication. By discontinuing the quinine treatment, fever and parasites, hitherto so very obstinate against quinine, will disappear by themselves; and should a relapse appear, perhaps after several months, you will find that your so-called quinine resistant case is now answering in quite a satisfying manner

to the same moderate doses of quinine as does any case of malaria in general.

Of course a direct parasitotoxic action and a combined action of immunity and chemotherapy do not exclude each other, but they may not always combine in a favourable manner. Thus it seems that salvarsan acts much more quickly and that its effect is much stronger in the first period of syphilitic infection than later.

A third mode of action of chemotherapy is purely stimulant, namely by stimulation of the reticulo-endothelial system, or by another still unknown factor; where there is reason to suppose that such a stimulant action has taken place, we may derive a general practical rule: *Chemotherapeutic substances of this kind must be given very cautiously in small or very moderate doses.* If given in excess they will prove harmful, even though they may not yet be toxic in the healthy body in the same doses. Any substance, if stimulant in small doses, will turn out in bigger doses to be a paralyzer of the still remaining resistant power of the body.

The stimulating effects of compounds are sometimes specific—useful against one kind of infection only; in other cases a wider action of the same stimulant may be observed. We can observe the same phenomenon with directly parasitotoxic agents also. Thus "Bayer 205" acts specifically only against trypanosome infection—sleeping-sickness; antimony compounds have a wider range of action, they influence not only sleeping-sickness and trypanosome infections in general, but also some other infections of an absolutely different aetiology.

The Treatment of Migraine.

By H. C. ROOK.

(*Lancet*, April 1927, p. 705.)

MIGRAINE, or at least a percentage of cases of this complaint, is caused by a hepatic toxin, which in pre-disposed subjects may be produced by nervous over-action or inhibition. Migraine occurs chiefly in persons with a highly sensitive nervous system, and toxins, both organic and inorganic, often show a predisposition to pick out and attack certain portions of the nervous system. Rook's treatment aims at what he regards as the real source of trouble—the liver. One hour before rising in the morning the patient takes 2 to 4 drachms of a 50 per cent. solution of magnesium sulphate, after which he lies on the right side for an hour. A large tumblerful of hot water or hot weak tea is then taken to assist evacuation of the salts. Each case must be treated according to individual peculiarities, but as a rule once a week or once a fortnight is sufficiently often to give the salts, the day or half-day previous being a starvation day. As regards diet, fats, eggs, chocolate, cocoa, coffee and alcohol must be strictly limited. Regularity of habit should be urged, and as far as possible freedom from worry and fatigue.—(*Prescriber*, April 1928, p. 135.)

The Treatment of Otorrhœa in School Clinics.

By A. R. FRIEL, M.D., F.R.C.S.I.

(*The Practitioner*, April 1928, p. 252.)

IN considering the subject of the treatment of school children for otorrhœa, it is necessary to discuss two questions: (1) how to treat each individual case of otorrhœa; and (2) how to use the facilities at our disposal so as to get the largest possible number of cases treated. Cases of otorrhœa due to middle ear disease are divided into two classes:—namely, acute suppurative otitis media and chronic suppurative otitis media (a third might perhaps be added—an acute attack supervening in an ear with chronic otorrhœa). In the acute condition, the tissues are attacked by bacteria: usually a pneumococcus or a streptococcus. In the chronic condition the tissues have repelled the invaders, but the discharge has become a fluid swarming with bacteria and irritating the tissues with which it is in contact.

In the treatment of the acute attack the line to follow is to assist the tissues by conserving the energy of the patient by rest in bed if possible; to relieve pain by warmth and moisture applied to the side of the head; to encourage a flow of serum from the ear by the use of glycerine drops; and finally to use every endeavour to prevent the fluid in the ear becoming a culture medium for saprophytes. This can be attained by absorbing the discharge with boracic powder insufflations when the acute inflammation is subsiding and the discharge is becoming less.

Since in chronic otorrhœa the basic factor keeping up the discharge is a septic fluid irritating the walls of the tympanum, the line of treatment indicated is to remove that septic fluid by absorption, or to apply an antiseptic which will make the fluid adhering to the walls a bad culture medium for bacteria and so render it non-irritating. The walls of the tympanum being then freed from irritation will cease to secrete fluid, and so the condition will clear up.

The subjoined table summarizes the lines of treatment to follow based on the indications present in an ear:

Cause of Chronicity.	Treatment.
(i) Accessible sepsis, e.g., tympanic sepsis.	In slight cases, insufflation of boracic powder.
(ii) Accessible sepsis with second factor in ear, e.g., polypus.	In more severe cases, zinc ionization with or without boracic powder insufflation.
(iii) Accessible sepsis with inflammation in a neighbouring organ, e.g., rhinitis.	Remove second factor, then ionize ear.
(iv) Inaccessible sepsis.	Treat neighbouring organ and ionize ear.
(a) Accessible with difficulty, e.g., cell in mastoid opening into tympanum or posterior meatal wall.	Use special instruments to gain access: (a) attic cannula; (b) gelatine covered wire.
(b) Totally inaccessible, e.g., most cases of attic and mastoid disease.	Make area of sepsis accessible by operation and then use ionization.

Zinc ionization, strictly speaking, is not a remedy for chronic otorrhœa, but rather a method of treatment which is applicable to a septic cavity when that cavity is readily accessible. As so many cases of chronic otorrhœa are kept up by sepsis in the tympanum, it follows that zinc ionization is useful in that condition. Moreover, as the results are so consistently good in cases of tympanic sepsis, we have a clue as to how to deal with other cases. Thus, when there is a factor, e.g., a polypus, present besides sepsis, keeping up the suppuration, we should remove this additional factor and then treat the sepsis with ionization; when the sepsis is in a position difficult of access, we should use special instruments to reach it; and when the septic area is totally inaccessible as in most cases of attic and mastoid disease, we should do an operation to make it accessible.

Local Anæsthesia.

(The Prescriber, April 1928, p. 130.)

THE toxic symptoms that not infrequently supervene after the administration of cocaine as a local anæsthetic, according to Leshure, can be prevented by previous oral administration of barbitone or its sodium salt (veronal-sodium). Half an hour before inducing anæsthesia he gives from 6 to 12 grains (0.4 to 0.8 gm.) of barbitone-sodium, and he finds that this completely obviates all symptoms of cocaine poisoning, such as pale, cold, clammy skin, rapid and feeble heart action, and convulsive tremors. Leshure has tried this method in 100 cases, and none of these has manifested any of the

symptoms mentioned. He regards barbitone as an efficient antidote to cocaine, and suggests that in cases where it has not been used and symptoms of cocaine toxicosis have supervened, barbitone-sodium might be injected intravenously as a remedy.

Borocaine.—The work of Copeland and Notton has resulted in the production of a series of borates of synthetic bases, generically termed borocaines. The term "borocaine" is now applied to ethocaine (novocaine or porocaine) borate, while "beta-borocaine" is the borate of beta-eucaine. A chemical investigation of "horocaine" has been made by Collins in the A. M. A. Laboratories, Chicago, with a view to ascertaining the exact formula of the commercial product, its purity, and whether it is a definite compound or a mixture. He points out that in 1910 a borate of *p*-aminobenzoyl-diethylamino-ethanol (novocaine) was described by Einhorn and Uhlfelder, its physical properties corresponding generally with those of the compound now described as "borocaine."

"S. F. 147."—Under this designation a new local anæsthetic has been put on the market by the Sandoz Laboratories. It belongs to the novocaine (procaine or ethocaine) series of local anæsthetics, having the same aromatic nucleus with a longer side chain. It is a white powder, forming crystalline salts with acids. Solutions are clear and stable; they withstand sterilization without decomposition, and can be administered with adrenalin. It is said to be equally valuable for infiltration and for surface anæsthesia, and to have only about one-third the toxicity of cocaine, without the effects of cocaine on the nervous system.

Winterstein has had this compound under investigation at his clinic since 1925. He finds the toxicity to be about 2.5 times greater than that of novocaine and slightly less than that of tutocaine. It produces good anæsthesia, rather more quickly than novocaine, but more slowly than tutocaine. The anæsthesia produced by "S. F. 147" is more prolonged than that effected by either novocaine or tutocaine. Slight hyperæmia is produced by its injection. In man good anæsthesia is produced by 0.2 per cent. solution: such a solution was successful in 230 cases, but to produce more rapid action 0.3 per cent. solution should be used, good results having been obtained with this strength in 470 cases. Winterstein strongly recommends the new anæsthetic for experimental and practical use.

Ephedrine.—In the course of certain experiments made with a view to obtaining a local anæsthetic less toxic than cocaine, Read and Lin (Peking) found that a mixture of ephedrine, adrenalin, and potassium sulphate produced local anæsthesia as intense as a similar mixture containing novocaine in place of ephedrine. The curious feature of this ephedrine anæsthesia is that the alkaloid ephedrine alone does not have any anæsthetic effect—it is only when combined with the two other substances that the result is produced. It is thought therefore that a definite synergism or chemotherapeutic relationship exists between these three compounds. The addition of 0.005 per cent. of ephedrine to a 1 per cent. solution of novocaine resulted in considerable shortening of the time taken in blocking the motor impulse along the sciatic nerve. Read and Lin suggest for use in dental surgery and ophthalmic work a mixture of ephedrine, adrenalin, and potassium sulphate, as the relative toxicity of such a mixture is low.

Narco-Local Anæsthesia.—This form of anæsthesia, in which a local anæsthetic is combined with a narcotic, is believed to be of value in certain conditions. Keller records nine cases of Cæsarean section in which this method was employed. The ages of the patients ranged from 20 to 41 years, and in all cases ether was contra-indicated for various reasons. No preliminary emema or purgative is necessary, and a dose of morphia sulphate (1/6 grain) with scopolamine hydrobromide (1/100 grain) is given one hour before operation. At the operation 0.5 per cent. novocaine is administered by infiltration, an attempt being made to infiltrate the entire thickness of the abdominal wall before incising it.

Some Notes on Diagnosis.*

By CLAUDE WILSON, M.D., M.R.C.P.

(*Brit. Med. Journ.*, April 28, 1928, p. 709.)

WHEN invited to read a paper at this meeting I recognized an opportunity for discussing some rather unconventional views on diagnosis—views which in one form and another I have held since my student days, and which have by no means been dispelled by the great additions made to medical knowledge during the intervening years.

Diagnosis is our first object when seeing a fresh case. Our patients demand a diagnosis, and our teachers have ever impressed on us the prime importance of making one, while from time to time an eminent authority deplores the lack of diagnostic accuracy in some widely read journal in a way which would seem to imply that an accurate diagnosis is possible in every case. In hospital diagnosis is at its easiest. The cases are mostly advanced examples of well-marked disease, and the means and methods of exhaustive investigation are at hand. Yet difficult cases are seen; and, in my younger days, a fairly regular attendance in the *post-mortem* room revealed much that had not been anticipated—just as it so often does on the operating table—and I early learned that the most confident diagnostician is seldom the most reliable.

It is well to recognize our limitations as well as our advances. Unless a case is trivial or transient or obvious, we are at once in difficulties. The clinical pathologist, the radiographer, and the expert specialist often help us to a conclusion, but we are perhaps as often left in doubt. The same may be said of the general consultant, whose knowledge, experience, and authority, though of signal value in confirming an opinion already reached, or in bolstering up our ignorance, too often fail to carry us much further. Still, we may generally trust the man who is not afraid to say he does not know; when he thinks he does know he is generally right. But the pronouncements of the pundit who courts the reputation of being able to diagnose every case are necessarily unreliable; the fact being that, up to the present time, a diagnosis that is more than a guess is, at the stage of the disease when it would be most helpful, often quite impossible.

The Relative Value of Clinical Methods.

The aspect and demeanour of the patient are sometimes so characteristic that a diagnosis can be made at a glance. No one can mistake the tabetic, the Parkinsonian, or the fully developed case of Graves' disease. The history of the patient's complaints and sensations can hardly be too carefully elicited, for the key to the trouble is often found here, while the family history and collateral evidence may be of equal value. Still, it is upon evidence obtained through the trained senses that one must depend in all but obvious cases. I propose to offer a few words on the kind of help which each of the senses provides, and in so doing it will serve my purpose best to begin with those which help us least and keep the most important to the end.

Taste hardly counts, though it is historically associated with the diagnosis of diabetes; and, while the olfactory sense may be conclusive, as in alcoholism, ozæna, acetonaemia, and *B. coli* abscess, its scope is strictly limited. Touch and hearing run a close race, though hearing wins easily if we include what is learned from the preliminary inquiry, and from the character of the patient's voice and utterance. In physical examination these two often help each other out, as in the timing of a thrill and a murmur, and in the feeling of resistance which accompanies the percussion note of apical consolidation and pleural effusion. But percussion generally depends on the sense of hearing alone, and the ability to detect slight differences of sound varies very much in different individuals. I never believed that it was possible to map out the stomach by percussion, and the advent of the x-ray meal has put it largely out

of court. Most misleading is the percussion of adjacent gas-filled viscera. A few weeks ago I tapped with two coins over the epigastric and adjacent areas, while a colleague moved his stethoscope about, and pronounced the stomach to be greatly dilated. But a stomach tube failed to bring off any gas, and an hour or two later the coils of an enormously distended small intestine were found to fill this area, indeed the whole of the anterior segment of the abdomen. The only thing certain about percussion of adjacent hollow viscera is that the results are uncertain. To a lesser extent, for the possibilities are less egregious, I have always held as suspect the percussion line of the left border of the heart. Very different outlines are made by equally capable observers of the same case, and I have frequently found that the radiogram is smaller than the area mapped out by percussion.

Auscultation, of course, yields invaluable information as to both lungs and heart, but it is well to bear in mind what erroneous doctrines have been taught through many decades, not because the auscultation was at fault, but because the deductions were founded on theories which have proved to be erroneous. It need not have taken about a hundred years to find out that a systolic mitral murmur was often quite harmless. Possibly the most unequivocally useful information rendered by the stethoscope is connected with the recognition of the foetal heart beat.

Coming to the tactile sense alone, and using the term in its widest significance, so as to include recognition of tenderness, heat, cold, resistance, and fluctuation, we find an immense amount of information available. Texture, irregularity of surface, foreign bodies, crepitus, the examination of the pulse and the heart, aneurysm, fremitus and friction, and the exploration of the throat and pelvic organs, carry us far. And the reflexes are probably destined to carry us much further than is as yet generally recognized.

If I have run rapidly through some points connected with the diagnostic value of what we may almost call the minor senses, it has been mainly for the purpose of bringing into contrast the overwhelming importance of the sense of sight. It has been very large in proportion to the degree in which different divisions of clinical knowledge have been brought within the range of vision that our powers of diagnosis have increased, and, fortunately, the range is being continually extended. The general glance, which, as already mentioned, may be diagnostic, is much more often suggestive. Pallor and cyanosis, obesity and cachexia, facial expression, lameness, and similar features, give us leads which are generally true. The distortions of surface produced by fractures, dislocations, tumours, and hernia are, of course, obvious. Beyond this the skin and the tongue and the throat can be seen unaided: sputa and excreta can be inspected, and urine tested. For the rest we must rely upon instruments, and while the use of almost all instruments requires practice, the interpretation of the results requires more, and invariably lags behind. Probably in all cases interpretation will ever be liable to revision and extension. What should we know of pyrexia without the clinical thermometer? Yet while a glance at a temperature chart, along with its record of pulse and respiration, may be in itself diagnostic, who will say that we are at the end of the knowledge which this simple little instrument may bring? It is only quite recently that the characteristic charts of lymphadenoma and rat-bite fever have been recognized.

What would be our knowledge of the diseases of the eye and of the nervous system without the ophthalmoscope? And what should we know of the larynx if it could not be seen? What would our general knowledge of disease be without the revelations of the microscope, with its histological pathology, its blood counts, and the intricacies of bacteriology? Without transillumination a filled antrum is a sealed book, and the new knowledge of heart disease depends essentially on visible tracings.

The cavities of the body in the immediate vicinity of the orifices have for long been explored by means of specula, but the ingenious applications of electric light,

* An abridged version of a paper delivered before the Tunbridge Wells Division of the British Medical Association.

which provide us with cystoscopes and sigmoidoscopes, and with appliances by means of which the mucosa of the stomach and other remote internal surfaces are being brought into view, are matters of yesterday. The advent of x-rays soon brought the accurate diagnosis of fractures and dislocations, and the localization of foreign bodies; the sockets of the teeth, the pituitary fossa, and the contents of the thorax were brought into the available field later; and while the exploration of the gastro-intestinal tract by means of barium meal and enema seems to have been long enough with us, the discovery of lipiodol and similar substances has recently added the bronchi, pulmonary cavities, the gall-bladder, the pelvis of the kidney, and the ramifications of sinus and fistula to the internal regions explorable by sight. The objection is sometimes raised that skiagrams may give misleading information. But this applies to all diagnostic methods, and skiagrams, like electro-cardiograms, may need expert elucidation. In obscure cases the experts themselves may be puzzled. None of the new methods has reached its zenith, and interpretation, as already stated, necessarily lags behind observation.

It is not without purpose that I have emphasized the paramount value of vision in diagnosis; it is not without purpose that I pass on to a few observations about the skin.

Disease Manifestations in the Skin.

Those parts of the body which are most open to easy and complete examination by sight and by touch ought to be those about which we know most, and in which changes due to treatment, general and local, should be most obvious. If such an area is also that most accessible to microscopic investigation, general and bacteriological, surely every facility exists for obtaining full knowledge of its physiology, its pathology, the diagnosis of its diseases, and their successful treatment. Yet if there is one part of the body which seems more puzzling than the rest, both as to diagnosis and as to treatment, I feel sure that a good many of us would think of the skin.

The experts who gather at the meetings of the dermatological societies often exhibit rarities and curiosities, and one may often notice the words "Case for diagnosis" on the agenda. Truly the skin is a humiliating structure. The limitations of our knowledge as to the essential nature of a lesion, and of its etiology, progress, and treatment, are here so obvious that it is not easy to deceive either ourselves or our patients; and many have said or thought that we know less about the skin than about almost any other system. Yet it may well be that, as should surely be the case, we do know more about the skin than about any other part; and that our ignorance of the invisible organs and systems may still be as profound as was our ignorance of the diseases of the fundus oculi before the days of the ophthalmoscope. There are but few skin diseases concerning which our knowledge may be said to be complete. One such is scabies; the cause is clear, the lesions are characteristic, and the treatment is known and is curative. With the syphilides the case is different; the ultimate cause is known, but why should the lesions be so strangely varied? Why, again, should the ubiquitous staphylococcus have so pronounced an attraction for the skin of the adolescent? And if endocrine instability is evoked, why should it select its unfortunate victims so capriciously? Of many well-known skin diseases we really know nothing as to the essential nature or cause. Of individual lesions we know that vesicles and pustules arise from very different causes—local irritation and infection, certain drugs, small-pox, and so on; but, except in the case of burns, trauma, and local infection, we know nothing of the reason.

Transient anomalies seem, if possible, to be even more bewildering. How strange are the characteristic rashes of the exanthemata, each with its distribution and its period of incidence and decline; and perhaps still more curious are the pallors, flushings, and sweatings from emotional causes, each being part of an immediate response to purely psychic influences involving widespread nervous, endocrine, and circulatory adaptations in

many parts of the body, but of which the skin reactions are alone in evidence. What effect does emotion have over other secretions? We know something of occasional renal response, and a good deal about tears. Emotion may cause profuse weeping or may dry up tears. What effect may it have on the gastric and biliary secretions? Doubtless profound effects, of which emotional vomiting, appetite juice, and the suggestive comments accompanying a carminative prescription are mere hints. What is the meaning of the muddy pallor with brownish wandering patches seen on the face in sea-sickness and in other conditions in which bile regurgitates? We see these things on the skin, but what is the liver—that immense organ which works in silence and in darkness—doing? All we can say is that we don't know. At a recent operation in which the liver was exposed I noticed little blisters which came and went and wandered, raising the capsule as they moved. What was going on within the recesses of the organ? We talk glibly about the liver being "out of order," but we do not know what is happening, and extreme cirrhosis, which had never even been suspected, may be discovered in the *post-mortem* room. One might dilate similarly upon other organs which, like the liver, work in silence and out of sight.

It is on the skin that we do see what is actually going on, and it is here that we may best gauge the extent of our knowledge and of our ignorance; and, surely, the balance is heavily weighted on the side of ignorance. And do not the grey, brown, black, and strawberry furs, and the curious wandering rashes of the tongue, and the little ulcers and hæmorrhages on the gums and on the cornea, point in the same direction? Doubtless analogous pallors, flushings, swellings, furs, ephemeral ulcers, and desquamations occur with equal frequency in unseen areas, and accompany and perhaps account for symptoms for which we have daily to invent mythical reasons.

What Constitutes a Diagnosis?

In discussing any question it is well to know what we are talking about. Which of us, asked to define the word "diagnosis," could supply a definition acceptable to all? In the first volume of the *James Mackenzie Institute Reports* (1922) there is a paper on the results of a collective investigation which had "the primary object of determining in what proportion of the cases met with in general practice it is possible to arrive at a diagnosis," and the first difficulty encountered was that no satisfactory definition of the word could be found. After much debate the following was framed: "The recognition in the patient of a known disease from the symptoms which are characteristic of it." If we agree to include signs under the term symptoms, as Mackenzie always did, the definition will satisfy most of us. But the difficulty which was next experienced in separating what may be fairly called "known diseases" from among "the maze of symptoms and so-called diseases in which medicine is becoming lost" was a real one, and one which we shall all do well to bear in mind. Space forbids more than the briefest epitome of the paper. A classification wide enough to embrace all cases was evolved; the "known" (diagnosable) diseases were divided into five classes according to whether the cause was known, surmisable, or frankly unknown, while end-results, such as the valvular lesions, and secondary diseases, such as cystitis, each received a separate compartment. Of the 794 consecutive cases investigated a "diagnosis" was made in only 28 per cent., while in 22 per cent. a partial or provisional diagnosis was allowed. But just half of the cases examined did not present the symptoms characteristic of a "known disease," and were consequently scheduled as "undiagnosable." Some of these cases were simple ephemeral complaints; some were isolated symptoms, such as unexplained headache, insomnia, tinnitus, and so on. Many were examples of groups of disjointed symptoms such as we often meet with and which bring discredit on the profession, because one doctor attaches one label and another another.

"We endeavoured," says the paper, "to divide the undiagnosable class into groups—for example, intestinal

toxæmia, neurasthenia, dyspepsia, etc. It might be better not to employ such terms at all, as they are apt to give an unconscious bias in favour of one theory over another. The undiagnosable cases," it concludes, "are apt to cause despair to the general practitioner, but if they were viewed rightly they present him with an invaluable field of study which is really open to him alone."

The reason why the field is "open to the general practitioner and to him alone" is that he is the only man who has the opportunity of following up his cases from month to month and from year to year. By patient observation, record, and study Mackenzie differentiated the cardiac arrhythmias, which had at first caused him "despair," and real knowledge of heart disease dates from these researches. It was only while engaged in general practice that he was able to follow up his cases as he did. But he was alone in his feelings of despair; his contemporaries were satisfied with theories now known to be erroneous.

Turning to the mass of ailments which still are "undiagnosable," how many of us are there that recognize them as such? Are they really apt to afflict us with despair? Are we not prone to think we hold the key to the bulk of these anomalies? Did we not, thirty years ago, ascribe countless ills to "uric acid"? Was there not a time—not long gone by—when the "up-to-date" practitioner had a vaccine for almost everything? That "blood pressure" should ever have been a popular "diagnosis" seems almost as strange as the queer idea that everything could be "Coué'd." These things may have had their day, but many of us become obsessed by the new or revived ideas as they come along, and perhaps it is the word "toxæmia" that is now on top of the wave. Toxæmia may be obvious, or probable, or problematical, but the relegation of its origin to the colon is often no more than a guess, even when faecal analysis seems to point that way.

The colon has had a long innings, but the early canonical axiom, "Cut it out and cast it from thee," has disappeared, while the more recent advice, based on high transpontine authority, "Grease it and leave it alone," is disregarded. Sour milk had a look in some twenty years ago, and fizzled out. Possibly *acidophilus* may share a similar fate. To "change the flora" may prove as difficult as to "disinfect." But we are on firmer ground when the escape of organisms can be proved. Rowlands has shown that the intestinal wall of rats fed on a full vitamin B diet was more than twice as thick and firmly knit as in the case of the controls; and in the few cases where he tried the treatment he found that urine which was teeming with *B. coli* "soon became sterile when the patient was placed upon a concentrated vitamin B diet." May not the well-nourished intestinal wall also prevent the absorption of toxins?

The vitamins have removed several obscure diseases from the region of bewildered speculation into the very front rank of diagnosable diseases—that is, into the small but ever-enlarging class in which the cause is definitely known. But the work by which these results have been secured has not come from the general practitioner. In endocrine disease also the best work has come from the laboratories and the schools; and, though the practitioner has by therapeutic experiment discovered various forms of sub-thyroidism, and done hopeful work with parathyroid and perhaps with other hormones, his blunderbuss work—generally the result of commercial suggestion—has been terrible. I sometimes wonder how many blunderbuss preparations would produce any result at all if the thyroid element was cut out.

If therapeutic experiment along toxæmic, endocrine, and similar lines can be called "investigation," we general practitioners are doing our duty nobly. But I see little of the patient laborious research to which Mackenzie devoted his life—these two kinds of inquiry lie poles asunder. Mackenzie's standard is too high for most of us; we lack the insight, even if we possessed the energy.

Is there not, however, some midway line along which we may all hope to do a little real, and possibly useful, work? There may be many; but anyone who forms the

habit of taking short notes—if only of cases which are obscure or which possess some points of special interest—finds in the course of a few years that a fund of material has accumulated some of which will certainly throw light on his subsequent reading and experience. Much useful work which, among other results, helps to elucidate diagnostic problems, depends essentially on the existence of some such store. Further, if we keep our eyes open we all occasionally come across cases—or possibly cases in series—of obvious illness which, after careful investigation, are not found to conform to any known disease of even label. Such cases ought to be recorded. The work is seldom wasted, nor is it without reward.

Reviews.

THE TREATMENT OF CATARACT AND SOME OTHER COMMON OCULAR AFFECTIONS.—By Lieut.-Col. Henry Smith, C.I.E., M.D., M.Ch., I.M.S. (Retd.). Calcutta: Butterworth and Co. (India), Ltd., 1928. Pp. 287, with 68 illustrations. Price, Rs. 7-8 net.

THIS is the second edition of this book which has been entirely re-written and brought up-to-date. Its main interest is the latest development of the Indian method of intra-capsular extraction of cataract, which has been elaborated by the author, and with regard to which he states that it constitutes a revolution of the greatest importance, reduces the operation to one of great simplicity, enabling it to be performed by unskilled hands; also that the incidence of vitreous prolapse is lower than in the capsulotomy operation. He further claims that it is destined to supersede all other methods commonly done, and will relegate the capsulotomy operation to the scrap heap for evermore.

Chapter I deals with the clinical examination of the eye, the classification and diagnosis of cataract, and the treatment to which each variety is suited. The author expresses many original ideas of his own, which are not revealed in standard textbooks on the subject.

Chapter II deals with operative technique and forms most interesting reading. The operations are described in great detail, in a simple, clear way and well illustrated. The Indian method of expression from without, with upright delivery of the lens is described as before, but the most interesting part of this chapter is the description of the soft Morganian lens with lower edge foremost as a tumbler, and the tumbling of the hard lens by combined pressure with the lens hook and spatula.

The author describes how he is now able to overcome the difficult problem of delivering hard cataracts as tumblers and states that the method simplifies matters to an extent almost beyond his dreams. Even in relatively unskilled hands an almost perfect control can be kept over the vitreous. The spoon is laid with its convexity over the wound and keeps the upper pole of the lens from moving. The lens hook is laid on the sclerotic below, care being taken that it is behind the lower pole of the lens. The lens then dislocates below and its lower border comes forward to bulge the cornea and is kept in position by pressure with the heel of the hook. The point of the hook is then lifted to disengage it from the conjunctiva in which it is liable to catch as it is brought up after the lens. The point of the hook is then dropped into the sclero-cornea preparatory to insinuating the cornea behind the lens. The spoon, having served its purpose, is then lifted off the wound. The point of the hook is then continued upwards and the lens with its capsule is delivered outside.

Barraquer's apparatus and operation is described by Russell Smith. It strikes one that his article is a very dogmatic section, written by an author of limited experience in criticism of an ophthalmologist with such great experience as Barraquer, and he sums up Barraquer's operation as one which pushes the lens violently to the exterior. Yet by such an eminent authority as the late

Professor Fuchs of Vienna, Barraquer was acknowledged as an expert in this particular operation. Colonel Smith has got hold of an absolutely erroneous idea when he says that Barraquer dislocates the lens backwards before removing it. He does nothing of the kind, nor does any other operator who uses suction methods. It is quite an easy matter to lay the cup on the anterior capsule gently and allow it to make contact without pressing the lens backwards at all. Even if Barraquer had dislocated the lens in a few cases, certainly it is not necessary to do so, and operators with any knowledge of the method would consider this idea wrong.

It is interesting to read the author's ideas on infiltration of the orbicularis muscle with novocaine in which he says anaesthesia and not paralysis, with any degree of regularity, is produced. This is a statement which cannot be accepted. It is carried out as a routine in the Calcutta Eye Infirmary with the result that an escape of vitreous is almost unknown in uncomplicated cataract operations.

Chapter III deals with the routine after-treatment of cataract operations. The author in discussing prolapse of the iris after cataract extraction states that "Excision of the prolapse at once is positively pernicious." This statement is against modern principles, as the safest procedure is to excise the prolapsed iris as soon as it is discovered and so avoid any permanent entanglement in the wound which may be later the cause of secondary glaucoma. In dealing with the treatment of after-ataract, Colonel Smith speaks of the sudden disasters which frequently destroy the eye when the 'trifling' operation of needling is performed on the after-ataract. Needling in after-ataract is exceedingly rarely followed by any reaction when carried out in the correct manner and with a gentle hand. Colonel Smith would replace needling altogether and advises pulling off the after-ataract with a curved iris forceps and does not regard the procedure as one of reckless daring. We cannot agree that the eye would tolerate it better than needling.

Chapter IV gives a short account of lens couching as performed by the Rawals, some observations on the historical aspects of the surgical treatment of cataract, and a consideration of the relative merits of intra-capsular extraction over the capsulotomy operation.

Chapter V deals with the treatment of glaucoma and some other common ocular affections.

In discussing chronic glaucoma, the author does not approve of the permanent utility of the operation of anterior sclerectomy, and states it is no substitute for an iridectomy done properly—a statement with which few ophthalmologists will agree. He dismisses in a few words the classical operation of sclero-corneal trephining perfected by Lieutenant-Colonel Elliott of the Madras Eye Hospital and now carried out so extensively all over the world, as well as being the recognised operation for chronic simple glaucoma in all the teaching Eye Centres in India. He would relegate the sclero-corneal trephine to the shelf of the museum of discarded surgical instruments but he would only have to visit the bigger Eye Centres of Bengal and Madras to see that it is far from being discarded. The sclero-corneal trephine operation of Elliott is still the operation of choice for the treatment of chronic simple glaucoma and will take a lot of replacing. In dealing with the treatment of corneal ulceration, the author takes considerable trouble to warn his readers of the fallacies of using atropine, with which one considers that but few ophthalmologists will agree. Atropine still holds the field as the most useful drug in the treatment of corneal ulceration.

In the treatment of interstitial keratitis, the author states that there is a general consensus of opinion that arseno-benzol preparations have no influence on the local condition. If he will visit the Eye Infirmary of the Medical College, Calcutta, where so many cases are treated, he would alter his opinion. The results that are obtained with sulfarsenol and bismuth injections are really marvellous.

In addition there is an appendix to the book which contains details of the state of vision of 132 cases of intra-capsular extraction of cataract on discharge from hospital; also the after effects of the escape of vitreous

during the operation of extraction of cataract in the capsule by Smith's method, with a tabulated statement and analysis of 98 cases in which escape of vitreous occurred; also the late results of intra-capsular cataract extraction by Dr. Arnold Knapp of New York.

In conclusion, in our opinion Colonel Smith's book is hardly a true representation of present-day methods in Indian ophthalmology, and it is hardly one that we would recommend for the use of students. On the other hand, the author has made enormous contributions to the progress of ophthalmology in India, and the intra-capsular operation is still the one almost universally used in the Punjab. The book is very well published; it is well illustrated and written in a clear and explicit style. It will appeal to many of Colonel Smith's pupils in India, and will be of great interest to medical men with experience of ophthalmological methods all over India.

E. O'G. K.

NEOPLASTIC DISEASES: A TREATISE ON TUMOURS.—By James Ewing, M.D., Sc.D. Third Edition. Philadelphia and London: W. B. Saunders Company, 1928. Pp. 127, with 546 illustrations. Price, 63s. net.

THIS is the third edition of Professor Ewing's great work on tumours.

Important alterations and additions have been made in the sections which deal with tumours of bones, of the brain, and of the breast.

As a work of reference, both from the point of view of its detailed treatment of tumours, and from the complete bibliography, this publication is invaluable to those who are concerned with the histological diagnosis of new growths.

G. S.

A TREATISE ON ORTHOPÆDIC SURGERY.—By Royal Whitman, M.D., M.R.C.S., F.A.C.S. Eighth Edition. London: Henry Kimpton, 1927. Pp. 1061, with 954 illustrations. Price, 45s. net.

DR. ROYAL WHITMAN'S book is not so well known to English surgeons as one would expect it to be from the great reputation of its author as an orthopædic surgeon. In America, however, it is a recognised classic and the fact that it has reached its eighth edition, renders it unnecessary for the reviewer to do more than to introduce it to new readers. It is a large work, over 1,000 pages and nearly the same number of illustrations, intended for the specialist and for the general surgeon, most of whom have to undertake orthopædic work occasionally, but the needs of the general practitioner are kept in mind and methods of systematic physical examination that lead to early diagnosis and the principles of preventive treatment, are allotted much space. Subjects are dealt with, in accordance with their importance in the hospital service with which the author is connected, so that we find tuberculous disease of the spine dealt with first, then spinal curvature and other spinal deformities and then the joints seriatim always with tuberculosis heading the list and receiving as much space as all the other affections of the joints together. This detracts from the value of the work to surgeons in this country, where traumatic affections, the sequelæ of acute arthritis suppurative or otherwise, and the results of neglected fractures or dislocations form the bulk of the orthopædic material to be dealt with.

The accounts of the treatment of tuberculosis of the joints is as complete as possible and it is interesting to note that the American school is not so enthusiastic over the merits of the traction trace as formerly in the treatment of tuberculosis of the hip and spine correction with immobilisation in plaster-of-Paris splints is finding increasing favour. The accounts of the construction and mode of action of apparatus are very full, so too are the descriptions of exercises for spinal cases, a necessary feature in a book for those who have to supervise this class of case.

The surgery of paralysis is very fully dealt with and the accounts of the many ingenious operations for

transfer of tendons are given in the author's own words with references to the original; as is to be expected the abduction treatment of fractured neck of the femur, the reconstruction operation for the hip-joint and the value of astragalectomy are treated by the originator of these procedures in a most interesting manner.

The final chapters deal with the reconstructive surgery of injuries and are an expansion of the former chapters on military surgery, a very valuable addition.

The only fault we have to find with an otherwise excellent book is the poor quality of the illustrations. Many of the photographic reproductions of radiograms, such as fig. 364, are unintelligible.

W. L. H.

PHYSICAL DIAGNOSIS.—By O. P. Emerson, A.B., M.D. London: J. B. Lippincott Company, 1928. Pp. 553, with 324 illustrations. Available from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 26-4 net.

THOSE who have been engaged in the teaching of clinical medicine during the last quarter of a century have recognised, not without alarm, the difference in the outlook of the student of the present day and his prototype of twenty years ago. Compared with recent times laboratory and special methods of examination were then almost rare, and the medical student of the period had to rely largely on his own unaided senses in attempting to make a diagnosis. The advance of medical science, however, has now placed at our disposal an overwhelming collection of tests, clinical, chemical and electrical, and special means of examination, which include almost every tissue, secretion and excretion of the body. This is all very good and necessary to progress, but there is more than a little danger that the all-important training in physical diagnosis, which is the basis of all practical medicine and which is so essential to the physician, may be relegated to a secondary place, instead of occupying the foremost position that of necessity is its due.

The scarcity of recent books on this all-important pivotal subject and the plethora of books on laboratory, chemical and instrumental methods reveals, in no uncertain way, this latter day tendency.

In view of these facts, the present volume entitled *Physical Diagnosis* appears at an opportune time and will be welcomed by practical physicians. The volume runs to over 500 pages, and in it there is no mention of a single test or method of examination that cannot be made by the unaided special senses. A few simple instruments, such as the stethoscope and the ophthalmoscope are mentioned, but no reference is made to elaborate apparatus such as the electro-cardiograph or an x-ray installation, nor to the clinical applications of chemistry, bacteriology or blood work. We believe that the book will be a salutary reminder of the primary importance of the fundamental and pivotal subject of physical diagnosis. To medical students in the tropics this reminder is especially necessary. There is a growing tendency to leave cases undiagnosed until laboratory, chemical, pathological and radiological reports have been received. This is an entirely unjustifiable proceeding and spells inevitable disaster for those who practise it. In the great majority of cases, the diagnosis can be made without special examinations, and these latter, therefore, should be chiefly used for purposes of confirmation.

In the general introduction in Chapter I, there is a brief account of the history of internal medicine which, as the author points out, is in a peculiar sense, the history of physical diagnosis. The rest of the book is divided into chapters on the general body surface, the head, the spine and thorax, the heart, the abdomen and the extremities. In connection with each area or organ discussed, there is a short account of the clinical anatomy of the part. A most welcome and useful feature of the book is the wealth of illustrations, photographs and diagrams—of these there are more than 300, and they add enormously to the value of the book.

The book perhaps is somewhat large for use as a textbook for medical students. As a *vade-mecum* on physical diagnosis and a book of reference for the

clinician we can commend it very highly. The paper, printing and binding are of the usual faultless style that we have learned to associate with American publication.

J. D. S.

CONVALESCENCE, HISTORICAL AND PRACTICAL.—By John Bryant, M.D. New York: Published by the Sturgle Fund of the Burke Foundation, 1927. Pp. 300, with 104 illustrations. Price, \$5.0 net.

THE author has written this book for two reasons. Firstly, because he considers that for many centuries past, no attention has been paid to this subject, and secondly, because the Directors of the Burke Foundation wanted a comprehensive and authoritative volume for their guidance. It has been admitted on all sides that adequate care of convalescents is very essential. The period of convalescence leads patients from disease to health, and if proper care is taken during this period, the number of half-cured patients is decreased. The majority of cases discharged from hospital have environments which are unfavourable for the convalescent. Chronic illness must be clearly distinguished from convalescence. In spite of the importance of this subject very little attention has been paid to it, but the time is rapidly arriving when convalescent institutions will form part of the general scheme of medical relief. To the physician belongs the period of convalescence no less than that of disease. Inadequate care of convalescence means (a) half-completed medical work, (b) half-cured patients, (c) inefficiency and economic waste.

The book is divided into three parts. The first few chapters are devoted to a chronological review of the subject. This is followed by an account of the activities of the Winifred Masterson Burke Relief Foundation which is a great charity institution for the convalescent poor of New York City and of the Cleveland Hospital and Health Society. In Russia there are houses of rest which are not only outside and inside every city, but exist in considerable numbers in the Black Sea summer resorts area. They are divided into three classes:—(1) where the visitors receive medical treatment; (2) where treatment is little more than regulated diet and routine; (3) simple vacation resorts. These are maintained by different unions for their members and are very useful institutions. The second part deals with the convalescent work in the United States Army, and the writer points out that during the Great War, the care of convalescents reached a higher level of efficiency in the army than anywhere else in the country. Foremost among the procedures which produced these satisfactory results were occupational therapy and physio-therapy, and the writer recommends that these should be adopted for civil institutions also.

There is also an interesting chapter on the medical and surgical aspects of convalescence, and on convalescence as a problem in preventive medicine and public health.

Part III deals with progress reports of the work from 1921—27.

The author has taken great pains to study his subject and we trust that this book will stimulate interest in this important branch of medicine.

R. N. C.

THE SEX PROBLEM IN INDIA.—By Prof. N. S. Phadke, M.A. Bombay: D. B. Taraporevala Sons & Co. Price, Rs. 6.

THIS is the first book on the subject as it applies to India, and the author, himself an Indian and a Hindu, has our greatest admiration for tackling the subject at all. Even more than in the West, sex problems in India are bound up with religious beliefs, and thus are emphatically a subject which if treated by a European would constitute almost an impertinence. None the less, one could wish that the author had sought the collaboration of a medical man before plunging into print.

Chapter II, "The Theory of Heredity," ends with the work of Weissman (whose name, by the way, is consistently misspelt throughout), and makes no mention of the true theory first discovered by Mendel.

Chapter XI, on the female genitals, their parts and function, is clear, though there is no evidence for the statement that interlocking of the glans and cervix is a fairly common occurrence, it has been categorically denied by Sir Archdall Reid, in reviewing for *Nature* Dr. Marie Stopes' works, from which the author has probably taken it, but these are blemishes almost unavoidable when a layman enters on ground hitherto unstudied by him.

The chapters on Hindu marriage customs, however, and the development of the thesis that child marriage is not specifically laid down in the Shastras, are the most valuable parts of the book, though criticism of these arguments presented are impossible to a medical reviewer, depending, as they do, on acquaintance with Sanskrit and Hindu philosophy.

Even supposing that India is weaned from child marriage, is it yet ready for birth control? We tremble to think of the application of cervical pessaries and the like by the uneducated—even if they could afford the contrivances, which, in good order, are short lived. Yet, as the author points out, without birth control, what is the future of this country? This part of the subject forms the subject of a thoughtful editorial in the June number of this Journal. Birth control must keep pace with preventive medicine, if economic disaster is not to follow, and in so far as restriction of population has so far apparently not been mentioned in this country, this book is useful as at least a beginning in the creation of public opinion.

Should a second edition be called for, we recommend the author to enlist a medical collaborator, and to add a chapter containing a concrete scheme of introducing eugenic and contraceptive teachings among the millions of this country that live by the labour of their hands.

FOOD INFECTIONS AND FOOD INTOXICATIONS.—

By Samuel R. Damon, A.M., Ph.D. London: Baillière, Tindall and Cox, 1928. Pp. viii plus 260, with 18 plates and 13 figures. Price, 18s. net.

THE author has written this volume as detailed information regarding food infections and food intoxications is scattered throughout the medical literature. In discussing his subject, the author has gone fully into the etiology, symptomatology, diagnosis prophylaxis and treatment in detail. An attempt has been made to separate the food infections from food intoxications, but there is a certain amount of unavoidable overlapping.

Part I deals with infections from food and contains information regarding paratyphoid infection, Malta fever, tuberculosis from milk, and actinomycosis.

Part II is very interesting and gives a description of botulism, mushroom poisoning, potato and fish poisoning, etc.

Part III deals with 300 parasitic infections acquired through food. Most of the information given in these two sections is to be found in textbooks.

The chapters on mushroom poisoning and grain intoxications are especially interesting and in the latter is also given a detailed account of lathyrism. The book is well worth the perusal of medical practitioners.

R. N. C.

APPLIED BIOCHEMISTRY.—By W. Morso. Second Edition, Revised and Resot with the Co-operation of J. M. Looney. London and Philadelphia: W. B. Saunders Co., Ltd., 1927. Pp. 988, Illustrated. Price, 32s. 6d. net.

THE fact that a second edition has been called for eighteen months after the publication of the first edition of this book, shows clearly that the volume is much appreciated by a large circle of readers. The book itself is fairly extensive, consisting of nearly one thousand pages spread over seventeen chapters. The author quotes in his preface, "The gods sell everything for labour," but it is doubtful if the ordinary medical student will have the disposition, even if he had the time necessary, to labour through so many pages of biochemistry, much of which, it may be added, lies outside his course in this subject. To the graduate and student, however,

who has a special taste for or necessity to study biochemistry, the book can be thoroughly recommended. In addition to the subject-matter of the text, excellent foot-notes for suggested reading, biographical notes and references are given, which should prove extremely useful: possibly in places this is rather overdone, especially where language derivatives are given. The volume is extremely well got up and, if anything, over-illustrated, containing, in addition to the technical illustrations, many portraits of American biochemists. The book on the whole will probably appeal more to the American than the English student of medicine. To the actual worker on biochemistry, however, it should prove of undoubted value.

T. C. B.

DIATHERMY: ITS PRODUCTION AND USES IN MEDICINE AND SURGERY.—By E. P. Cumberbatch, M.A., B.M., D.M.R.E., M.R.C.P. Second Edition. London: William Heinemann (Medical Books), Ltd., 1927. Pp. 332, with 87 figures. Price, 21s. net. Agents in India: Messrs. Thacker, Spink and Co., Calcutta.

THE first edition of this work was published in 1921. It was practically a pioneer work in a subject about which little was known in this country. The present edition is practically a new work, owing to the tremendous strides this branch of medical science has made since then. This is particularly the case with diseases due to infection by the gonococcus, more especially in women. The experience, gained in the treatment of these diseases by diathermy in the Electrical Department of St. Bartholomew's Hospital during the last six years, is incorporated in this edition.

An account of the new "cutting currents," so much in vogue in America, has been added.

Apart from this, there has been a complete revision of the subject-matter of the preceding edition.

As it stands the work is comprehensive, up-to-date, and is easily the most readable of all current works on diathermy. Dr. Cumberbatch is to be congratulated, not only on the research work carried out under his supervision at St. Bartholomew's Hospital, but also on the high standard he sets as a writer, and the inherent modesty of his pronouncements.

We can confidently recommend this work to all practising surgeons and physicians.

J. A. S.

A HANDBOOK OF HISTOLOGY.—By A. McL. Watson, M.A., Ph.D. Edinburgh: E. & S. Livingstone, 1928. Pp. 207, with 1 colour and 53 other illustrations. Obtainable from Butterworth and Co., Calcutta. Price, Rs. 6-6.

THIS is one of a series of new, small and convenient handbooks for medical students, issued by this well-known firm. The author writes that the aim of the volume "is to present to the medical student a short, concise description of the tissues and organs, with illustrations prepared from class specimens." The illustrations are in every instance originals and are in general good. The publishers have done their very best for the book, for it is printed on thick and highly glazed paper, in order to give the best possible reproduction to the numerous half-tone illustrations. There are some weak points in the book; for instance we consider the plate of normal cells of the blood on page 44 very poor.

On the whole, however, the book will be found a very useful one for students, and even to the microscopist who has to look up the normal histology of a part in order to compare it with a similar, but diseased, tissue. The book is very well bound and of most convenient size.

ULTRA-VIOLET RAYS IN THE TREATMENT AND CURE OF DISEASE.—By Percy Hall, M.R.C.S. (Eng.), L.R.C.P. (Lond.). Third Edition. London: William Heinemann (Medical Books), Ltd., 1927. Pp. 236, with 57 figures. Price, 12s. 6d. net.

THIS little book has reached its third edition in three years. This fact alone is sufficient proof of its popularity,

and at the same time emphasizes the author's desire to keep abreast of the times. Owing to the growth of our knowledge of the subject, the work has been largely re-written. As before, it is profusely illustrated—practically every known type of lamp and various pieces of accessory apparatus being figured. Special stress is laid on the quartz and mercury vapour lamp, which is the apparatus of choice for the general practitioner.

A new chapter on infra-red rays has been added. It contains valuable information on the subject, also on the nearly related one of light treatment through screens, cutting out certain parts of the spectrum, such as red-ray treatment and cold light treatment.

This little work—one of the pioneer efforts on this interesting subject—still retains its position as one of the most lucid and up-to-date expositions on a subject which is coming more and more into prominence in the medical world.

J. A. S.

ON THE DYSENTERIES OF INDIA. (WITH A CHAPTER ON SECONDARY STREPTOCOCCAL INFECTIONS AND SPRUE.)—By Hugh W. Aton, Lieut.-Col., I.M.S., Professor of Pathology and Bacteriology, Calcutta School of Tropical Medicine and Hygiene, and R. Knowles, Lieut.-Col., I.M.S., Professor of Protozoology, Calcutta School of Tropical Medicine and Hygiene. Calcutta: Thacker, Spink and Co., 1928. Pp. xiv plus 178. Price, Rs. 7-8.

MUCH has been written on the subject of dysentery but if we except the articles by Manson-Bahr in Byam and Archibald's "System of Medicine in the Tropics" and the treatise by Sir Leonard Rogers on "Bowel Diseases in the Tropics" no publication has appeared recently, which has aimed at giving a comprehensive and systematic review of the whole subject, nor one which applies more directly to the disease as it is found in India. It is, therefore, with the greatest pleasure and anticipation that we welcome the appearance of the present book, written as it is, by the brilliant and facile pens of two authors who are acknowledged experts and are, therefore, exceptionally well qualified to deal with the subject.

In their preface, the authors modestly imply that they are indebted to others for the greater part of the subject-matter. This however is far from being the case. As far as the text is concerned, the reader will find ample evidence of their own researches and the new viewpoints which have been reached by them in regard to the various aspects of this protean disease. It is otherwise with the illustrations. The profession outside India may be surprised to learn that the opportunities for pathological study amongst such a wealth of clinical material as is available in Calcutta are so small that the authors have had to borrow the majority of their illustrations from foreign sources. The difficulty of obtaining post-mortem examinations is, however, one of the greatest stumbling blocks that confronts medical workers in this country and one which hampers true research at every turn. The illustrations are for the most part derived from well-known monographs, those dealing with the macroscopic appearances being reproduced from the Atlas *Tropischer Darmkrankheiten* by Barmann and Eckwesdroff and "Dysentery in the Federated Malay States" by Fletcher and Jepps, and the figures illustrating the protozoa from Dobell and O'Connor's publications. Two plates giving the appearances of the cysts of the chief intestinal protozoa in man and certain photos showing the X-ray appearances of the gut in chronic cases are new and well up to the standard of the other illustrations. The representations of the various cysts are admirable and should be of great use to beginners at this type of work. Although the sizes of the amoebic cysts are given in the text, a scale of magnification, or better still, a note of the objective, ocular, etc., used in the preparation of the plates and added to the description would enhance their value to the general practitioner who is not accustomed to microscopic measurements.

The book itself is divided into nine chapters, each dealing with special aspects of the subject.

The opening chapter deals with morbidity and mortality, seasonal incidence, causation and relative frequencies of the different types of the disease in this country. Here we are informed that cholera and dysentery are almost equally placed for the third and fourth places in order of importance in the Indian mortality rates and that both are much more important for all India than plague, a fact which is by no means generally appreciated.

The seasonal relationships of the disease are shown by a series of All-India charts which demonstrate the all-powerful influence of the rainy season on the incidence of the disease. It should be remembered, however, that such charts represent general conditions only and cannot be taken as universally applicable; thus in certain areas in Eastern Bengal, the greatest incidence of the disease corresponds with the height of the cold season. Of greater importance to the clinician, however, is the description of the relative frequencies of the different types of dysentery and all the implications it holds with regard to faulty treatment. The authors clearly show that as the result of numerous independent investigations bacillary dysentery is at least five or six times more common than is amoebic dysentery and that the almost universal use of emetine in treatment in this country is entirely erroneous and may do irreparable damage without alleviating the symptoms. We fully endorse the authors' concluding sentence "We wish that we could bring home to the medical profession in India the much greater prevalence of bacillary than amoebic dysentery, for therapy—if it is to be successful—must be based on a correct knowledge of facts."

Chapter II gives a very clear, concise and up-to-date description of the etiology, pathology and symptoms of both acute and sub-acute bacillary and acute and sub-acute amoebic dysentery. We are glad to note that special attention is drawn to the occurrence of mixed infections in which amoebae and the dysenteric bacilli are both found, a fact which has not been generally recognised and the possibility of which has in fact been denied in some quarters.

Chapter III is devoted to the diagnosis of the disease which includes the laboratory examination of the stools and a description of the *Entamoeba histolytica*. Here we see the authors at their best. Full directions are given which contain just those details that make all the difference between success and failure, and can only be supplied by those who are themselves familiar with the practical details of such examinations. Attention is drawn to the cytological differences between the stools in the two types of the disease and full descriptions of the *Entamoeba histolytica* and its methods of cultivation are given. The uses of the sigmoidoscope as an aid to diagnosis are also fully explained.

In the next chapter, the difficult question of the bacteriology of bacillary dysentery is dealt with. A complete survey of the intestinal flora found in such cases is made. Such a survey must needs be condensed and some difficulty in following certain parts of the description may be found by those who have not made a special study of the subject. The directions given for the isolation of the dysentery group, together with their reactions, are easy to follow. The difficulties encountered in the serum tests are fully stated, and as a result, the authors give it as their opinion, that it is safer to rely on the results of the sugar tests than on the agglutination findings. Sufficient stress has not perhaps been laid upon the variability found in the biochemical reactions of the dysentery organisms and their inability in certain cases to ferment such important "sugars" as mannite immediately after isolation. In such cases, serum tests are important, as they enable mannite fermenting strains to be recognised, which might otherwise be considered to belong to the Shiga group. A valuable summary of our knowledge of the toxins and immunity reactions of the two types of dysentery organisms, which are of such practical importance from the point of view of scientific treatment, brings this chapter to a close.

The treatment of acute infections is next dealt with. The correct dietaries, which differ according to the type of organism present, and the principles underlying the use of serum and the bacteriophage in bacillary dysentery and of emetine in the amoebic type are clearly enunciated and will repay careful study. It is interesting to note that, after trial with the majority of the numerous compounds introduced since the war for the treatment of amoebic dysentery, the authors still consider emetine to be unsurpassed for this purpose. We are glad to note that the great importance of absolute rest in bed even in mild cases of the disease as a means of preventing relapses is emphasized.

Chapters VI and VII deal exhaustively with the chronic types of the disease and the carrier state. The immensity of the problem of the "chronic dysenteric" makes this chapter one of the most important in the book. The pathology, symptomatology and the difficulties connected with the diagnosis and successful treatment of these conditions are dealt with in turn. The authors have made a special study of the baneful effects of chronic infections of the intestinal tract on the various systems of the body and they attribute many of the symptoms of chronic ill-health found both in Europeans and Indians, particularly those of the neurasthenic type, to this cause. The importance of secondary infections, especially the hemolytic streptococci and the toxins elaborated by such invaders is emphasized and attention is drawn to the ways in which the different systems of the body, especially the endocrine glands, are affected. The authors have undoubtedly introduced a new conception of the processes at work and their results in these conditions which cannot fail to have a stimulating effect on the treatment of such cases and to improve the almost hopeless prognosis which has been the fate of many of these unfortunate sufferers in the past. The frequency of cirrhosis of the liver in Bengal is mentioned on the authority of Sir Leonard Rogers, as a result of chronic irritation, following the amoebic type of the disease only. No mention of the possibility, and in fact the probability, of the much more active toxins of the dysentery bacilli producing a similar action, is made.

A special chapter is devoted to the authors' views on the results of streptococcal infections secondary to bacillary dysentery. In their opinion, such infections may be responsible for the "mucons disease" of infancy, sprue and hill diarrhoea and an asthenic diarrhoea in Indians of which "Sutika" is a good example.

The streptococcal theory of sprue is no new one, as the authors themselves point out, and the possibility of a close connection between previous dysentery and sprue has also been recognised. There is no doubt, that many cases of the so-called "hill diarrhoea," a disease with very similar symptoms, are in reality cases of Flexner infection. There are, however, certain cases which conform more closely to Crombie's original description, in whom the effect of altitude appears to be of primary importance. Further, Macleod and Fairley, who have recently conducted a most exhaustive investigation into the etiology of sprue, have been unable to find any definite relationship between the two diseases. Further evidence on this subject will thus be required before the authors' views can be accepted in their entirety.

The prophylaxis of the disease is dealt with in the final chapter. In addition to the usual sanitary measures, more recent methods, such as the "macroscopic" examination of the stools, prophylactic vaccination by various types of vaccines, including "bilivaccine" and the possible use of D'Hercle's bacteriophage are all passed in review.

A valuable list of references to the voluminous literature on dysentery will be found at the end of the book. It is curious, however, seeing that dysenteries in India is the main theme, that the authors have omitted reference to the publications of the greater number of Indian pre-war workers. In addition to Sir Leonard Rogers, Forster, Greig, Wells, Morison and finally the reviewer conducted almost continuous inquiries into the disease from 1907 onwards until the outbreak of the Great War.

Forster in 1909 emphasized the great prevalence of bacillary dysentery in the jails in this country and was probably the first, apart from Shiga himself, to use a Shiga vaccine on an extensive scale. The knowledge that bacillary dysentery was the most prevalent type of the disease was thus available in pre-war days, but it required a cataclysm like the Great War to arouse general interest in the disease and drive the knowledge home to the profession at large. The fact that the greater part of the work of research workers in India at that period appeared in reports and memoirs which had little circulation outside this country must, undoubtedly, be held responsible for the fact that this knowledge was delayed so long.

The comments we have made do not for one moment detract from the sterling value of the book. The authors are to be congratulated on the production of a book which can be recommended alike to the clinician and laboratory worker and one in which the two aspects of the subject have been happily blended into one harmonious whole. The print and general get up of the book are excellent. There are singularly few misprints. In fact the only one which came to our notice was the spelling of "fermenters" with an "o" in one of the earlier chapters (page 25) and with an "e" in Chapter IV (page 66, *et seq.*).

J. C.

SIX TECHNICAL LECTURES ON LEPROSY.—

Prepared by the Leprosy Department, School of Tropical Medicine and Hygiene, Calcutta, 1928. Pp. iv plus 140, with 105 illustrations. Published by The British Empire Leprosy Relief Association (Indian Council). Price, Rs. 1-4.

THE more one studies the leper problem, the more one is convinced of the fact that one of the chief essentials in the present campaign against leprosy is the careful instruction of doctors and medical students in the chief aspects of the disease. The appearance of this series of lectures on leprosy is therefore timely. Everything is described in a clear and simple way. To anyone who is undertaking the spread of the present-day knowledge of leprosy, a perusal of this book, coupled with one's own clinical experience of the disease, will enable him to give an excellent course of instruction. Besides the lectures, there are 105 photographs, diagrams and charts. A set of lantern slides corresponding to the pictures can also be obtained.

Lecture 1 gives a clear account of the course of the disease and the classification of the various types and stages. The photographs and diagrams accompanying this section are particularly good and illustrate the various points discussed in a way which leaves one with a good knowledge of the clinical stages of the disease.

Lecture 2 deals with infection. Here are discussed the theories of transmission of leprosy from the diseased to the healthy, the sites of initial lesions, incubation period, predisposing causes, etc.

The pathology of the disease is dealt with in Lecture 3. The lepra bacillus is described, the method of spread of the disease throughout the body and the various types of lesions met with. Several good microphotographs accompany this section.

The last three Lectures are devoted respectively to diagnosis, treatment and prophylaxis.

Under diagnosis the cardinal signs and the subsidiary signs of leprosy are given in detail. The methods of snip taking, staining, and testing for anaesthesia are clearly described. Differential diagnosis is fully dealt with.

The various drugs used in treatment at present are well set forth. These include hydnocarpus oil, hydnocarpus esters, sodium hydnocarpate, potassium iodide, and trichloroacetic acid for counter-irritation, while due attention is paid to the treatment of accompanying diseases, especially syphilis and the necessity for paying attention to diet and exercise.

Under prophylaxis the great danger to others of the infectious cases is pointed out, and the arrangements which are necessary for their isolation. The precautions

to be taken by doctors and attendants are also described. We can unhesitatingly recommend this small volume.

R. S. D.

ESSAY REVIEW.

INDUSTRIAL MEDICINE.

(Being a review of the *Fifteenth Annual Report of the United Fruit Co., Boston, Mass.—Medical Department, for the year 1926.*)

MEDICINE, in the hands of the ordinary practitioner, is primarily the derivation of a livelihood from human morbidity. As "Public Health" in the hands of the State, it is mainly philanthropic, with usually a far too small admixture of paternal legislative compulsion superadded. A more recent development is its direct application to Industry, and now many railways, mines, plantations, and manufacturing concerns maintain a medical department, the function of which may extend all the way from the purely curative to organizations taking entire charge of everything appertaining to the health of the employes, and range in magnitude from the solitary dispenser of the average Ceylon tea garden to a department directly comparable to the medical service of a Government.

In the report under review we are introduced to industrial medicine at its *apogee*. Here we encounter a personnel of—

Medical officers	53 (including one woman),
Consultants ..	6,
Nursing sisters	48,
Other staff ..	583 (including a Chief Sanitary Inspector),

operating in nine divisions, plus a headquarters. Not even the great railway companies of this country can make such a showing; but, in the case of the United Fruit Company, we are not dealing with any organization in which there is the smallest admixture of commercial influence or capital, but with one of the greatest of the American Trusts—those much abused corporations commonly reputed to be soullessly devoted to profits at all costs. That a purely business concern of this nature should devote funds for the maintenance of a medical department of this magnitude can be taken as proof positive that they find the application of medicine to industry financially profitable. Let no one imagine that there can be on this Company, as there might be, even in India, a measure of State compulsion to care for the health of their employes, for the United Fruit Company operates almost entirely in what we have learned from O. Henry's novels to designate as the "Banana Republics"—the tragi-comically volcanic States of Central America, where political instability and administrative ineptitude have reached a pitch only reproduced elsewhere by the present condition of China.

It may, therefore, be taken as absolutely certain that such a Company would not maintain a medical department, unless to do so added materially to its profits, and that the size of the department, great as it appears, is not for any altruistic reason maintained at one sweeper more than can be justified to the management by its Chief. And yet what do we find, from the report, this Company doing medically?

In the first place the report contains photographs of hospitals which any Indian city would be proud to number among its public buildings. In them over 29,000 persons were treated during the year under review, with a further 241,000 out-patients at these hospitals, and an unspecified number of "field dispensaries," particulars of which are unfortunately in no case given. Nearly 2,000 major operations were performed, and we find a classification of diseases treated which for completeness puts the annual reports of the provinces of this country to shame. There are 143 heads of return, but in the case of the 29,000 cases admitted to hospital their diseases are further subdivided into 349 heads, which must be near the full known total of the ills that flesh is heir to. But next we come to statistics really valuable to the general management, the percentages of employes daily in hospital, average number of non-effective, partially effective, etc., statistics in this country only obtainable in regard to the Army. If, in spite of all this care, 14.27 per cent. of employes are non-effective—which we take from our own experience to be an excellent result—what would similar statistics for India reveal? But even this model report fails to institute local comparisons, whilst an expenditure statement, for some reason, is omitted. This, as the crux of the whole problem, is most regrettable; but perhaps it forms an item in the annual "Reports of Accounts" of the Company, published elsewhere.

Truthfully, it would pay the medical profession in this country to compile similar statistics. Clive Street possesses business "savvy" at least not incomparable with that of Wall Street.

Let us turn next from the statistical to the more strictly professional sections of the report. Again, we stand amazed at the volume of investigation reported—not done, be it remembered, by a carefully fostered research staff devoting their whole-time to this, but by practising medical men whose employers apparently expect them to devote part of their time to the enhancement of medical knowledge in aspects immediately useful to the Company. We do not find basic researches, which it is the proper sphere of the great research institutions, such as the schools of tropical medicine, to undertake, but the scientific tackling of every-day problems, which here in India such institutions must tackle for lack of similar interest or opportunity on the part of the vast mass of practising medicos in this country.

Commencing with malaria, which the General Manager of the Medical Department in his covering letter to the President of the Company admits is directly responsible for from 38 to 40 per cent. of all hospital admissions, we find seven papers on subjects ranging from anopheline surveys to the elaboration of a precipitin test for the diagnosis of the disease, which for their "practicalness" would be hard to beat. In the first, the epoch-making researches of James and Shute in England—long since fully noticed in this journal—are very fully summarized, and their results pointed out in their applicability to the problem as it affects the Company. These briefly are:—

(i) That a parasite survey demonstrated that men off duty in labour camps, but not on the sick-list, showed thrice as many positive blood findings as those at work.

(ii) That of these ambulatory malarias, nearly one-quarter showed as heavy a parasitic infection as the general run of cases in hospital.

(iii) That the gametocyte rate (chiefly crescents) was 13.5 per cent.

(iv) And that cases discharged from hospitals after treatment showed a gametocyte rate of 45.9 per cent.

It follows that a malignant tertian case "discharged cured" is a very distinct menace to his surroundings, and warrants in addition to "after-treatment" an intensive, short radius campaign of anopheline larva control around camp sites. The few breeding foci in the immediate neighbourhood are a much greater menace than the large, remote, breeding foci.

As, according to James, malaria is a "house-infection," fly-swatting or house-spraying is indicated. This is very difficult in Asia, owing to the purdah system, and the reviewer only knows of one instance, in Madras, where it has been attempted. In any case, it is very doubtful if Indian anophelines are house-dwellers between bites to the same extent as *A. maculipennis*; they probably affect the surrounding undergrowth for rest and digestion.

Recommendations, for after-treatment, and treatment without hospitalization, are made. As the paper concludes "We are attempting a practical control of malaria to reduce hospital admissions and supply more labour. This policy should tend towards the future reduction and stabilization of the labour force." Can any employer desire a more sane or practical outlook from his medical staff?

The anopheline survey and the precipitin test papers cannot be adequately summarized here. The latter—not yet perfected—bids fair to yield better results than even the examination of thick films, but it apparently fails completely to differentiate between the three species of parasite—no small a matter if a drug like plasmochin, which is quite inert against the trophozoites of *Plasmodium falciparum*, should come into general use.

Another paper claims good results with hæmostatic serum in blackwater fever.

In the paper on plasmochin the results of the only post-mortem so far obtained on a case of death after the use of this drug are detailed. The liver was the organ mainly affected, but the actual cause of death remained obscure. It is not proposed to go into detail on the results of treatment with the drug here. The whole subject merits a full analysis of the published results of all workers. The medical officers of the Company are themselves not unanimous in their opinions regarding it.

From malaria, the report passes to the second great group of diseases affecting tropical labour—the dysenteries. The two papers included are: (i) a thoughtful article on the diagnosis of amœbiasis in the hands of the average worker, and *not* the protozoological specialist; and (ii), a paper by Sir Aldo Castellani, one of the consultants, on the classification of the bacillary dysenteries. Next, lobar pneumonia, which accounts for 23 per cent. of the hospital mortality of the year, meningitis, and influenza are each the subject of a paper. There then follow some forty other papers dealing with unusual cases that have presented themselves in practice; with the serology of syphilis—several papers—snake-bite (four papers), concluding with one paper each on the bionomics of the biting ceratopogoninae—(the author calls these sandflies, which seems strange to oriental workers); equine trypanosomiasis, and embalming. Some excellent book reviews conclude the literary section of the report.

Styled an "Annual Report," the book almost ranks with the *Medical Annual* as an indispensable volume for study by medical practitioners in the tropics.

Finally, owing to its industrial importance, we would draw attention to a report on "The selection of labour recruits" by Dr. W. Cordes, Bacteriologist of the Cuban Division. "The criterion for fitness consisted only in the examiner's judgment as to whether a man was in a satisfactory condition to perform his duty as a cane-cutter for five or six months, and at the same time not become a disseminator of some disease or a charge on the hospital." This is precisely the standard that is required in this country in regard to contractor's labour for public works of all kinds. At present there is absolutely no check of any kind on the collection by recruiting agents of human wreckage of the worst description, so be it that they can collect commission thereon. With regard to tea garden recruiting, Government is more concerned with the prevention of kidnapping than with medical considerations proper. Even Ceylon, with its magnificent quarantine at Mandapam, only holds back a few major infectious diseases, and is not concerned directly with loss to the prospective employing companies, though these have to bear quarantine costs for all importations. But here we find 3.8 per cent. of recruits rejected, of which no

more than 0.6 per cent. might have been caught even by the Ceylon regulations, being children too young for work. As the average coolies for earthwork cost about Rs. 30 in advances to recruit nowadays the saving to prospective employers by the introduction of even a low standard of medical inspection for utility is obvious. The same lesson is also stressed in the observations of Fletcher and Jepps (1924) on dysentery in the Federated Malay States; the worst and most fatal type of dysentery with which they had to deal was among the immigrant malaria-ridden coolie labour imported from Madras. When really expensive labour is concerned, such as tea garden labour, the saving is even more obvious. A magnificent testimony to the popularity of the Medical Department of the United Fruit Company is the statement that many sufferers from chronic diseases endeavour to obtain employment with the Company solely with the idea of obtaining free hospital privileges. Not being a philanthropic concern, the Company rightly discourages this.

In Asia there is nothing on the scale of this organization of the United Fruit Company, except the Medical Association of the Estates of the East Coast of Sumatra. The Indian Empire can show nothing like it. What pays the American and the Dutch—the latter a notoriously conservative race—would surely pay British-Indian industrialism, and we look forward to the day when Clive Street will awake to the losses that it suffers from not having equally well organised medical services under its control.

R. SENIOR-WHITE.

Annual Reports.

REPORT OF THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION (INDIAN COUNCIL) FOR 1927.

THIS report marks the completion of three years in the life of the British Empire Leprosy Relief Association, Indian Council. The two reports already published described the efforts made to bring this Council into being, and the measures taken to consolidate its financial position and to outline the basic principles of its activities.

In the scheme of the anti-leprosy campaign which the Association has put into operation, the respective parts to be played by the Central and Provincial Committees in carrying forward the aims and objects of the Association are definitely apportioned. In the year under report the scheme has been in full operation, and the results indicate that the campaign is being directed on the right lines. By reason of the adherence of the Central and Provincial bodies to their allotted spheres there has been no overlapping of activities, nor any waste of energy; and the pace of progress has been accelerated. The policy and principles enunciated by the Indian Council, which are expressed in its "Memorandum on the method of conducting an Anti-leprosy Campaign in India," and to which a detailed reference was made in last year's report, have formed the basis of the work of the Provincial Committees.

It is of course too early to expect any visible results. Many cases of leprosy have responded to treatment; but the leper population is so large that it must necessarily be a matter of years before the Association can claim that its activities are checking and reducing to any considerable extent the incidence of the disease. The campaign must be arduous, long and intensive. The first and foremost difficulty of the task is the prevailing ignorance in regard to the nature of the disease. Even practising physicians have still much, in some cases all, to learn. Not long ago, one of the Association's workers met a doctor who was ignorant of the fact that both he and his servant were suffering from leprosy. The work which the Association has begun and which fully occupies its present resources has served to reveal the enormity of the problem with which it is confronted. One of the primary tasks is to spread knowledge, and it is for that reason that the Association hopes much from the classes held in Calcutta, at which medical men from all parts of India are receiving instruction in the diagnosis and treatment of leprosy.

Scientific researches, in so far as they have been made, and they are daily throwing fresh light on the different phases of the problem, have proved beyond doubt that effective methods are available of clearing up the symptoms and infectivity of most of the early, and some of the more advanced cases. With this knowledge has come the hope that leprosy can be eradicated from this country, in fact from any country, provided the disease with all the different phases of the problems connected with it can be brought under proper control.

The incidence of the disease and the conditions favouring its prevalence and spread vary so widely with the varied manners, customs and dietetic conditions followed in the different parts of the country, that a comprehensive study of the distribution of leprosy is essential to an understanding of the many difficulties to be overcome in dealing with this widespread, but insufficiently known, disease.

Our knowledge of the incidence of leprosy in India is dependent on the 1921 census figures which were collected by untrained enumerators and are avowedly inaccurate. These figures, while they give very little idea of the total number of lepers in India, are useful as indicating the relative incidence in different provinces and districts. With a view to the collection of more accurate information, as foreshadowed in the last Annual Report, an experimental survey of selected areas was instituted during the year under report, which as the succeeding paragraphs show, has brought to light such facts and figures, as to convince the Council of the necessity of continuing it at least to the end of 1928.

Dr. Santra, who has gained considerable experience in leprosy work while working under Dr. Muir at the Purulia Leper Asylum, Bihar and Orissa, was appointed along with four assistants to carry out this survey. The points to be ascertained were:—

(a) The relative incidence of leprosy in different parts of India.

(b) The classes of people among whom leprosy is most rife.

(c) By comparison of leprosy with non-leprosy areas, and castes and classes of people among whom leprosy is common with those among whom it is not, the ascertainment of the causes that underlie high incidence.

The method employed is to choose a suitable thana or police area in a highly leprosy district and establish headquarters at the centre of this thana. Villages are visited and, with the help of village authorities, cases are sought out. Lantern lectures are delivered at night explaining the nature of the disease and the means which should be taken for prevention. A treatment centre is started and held twice a week, the rest of the time being used to complete the survey by house to house visiting. In some of the centres as many as 200 patients were attending within a fortnight and further survey was rendered easy by the help of grateful patients who welcomed the doctors to their villages and gave them all the help possible. Thus, not only was a census of leprosy taken, but incidentally treatment centres were initiated and a large amount of propaganda work was

carried on. Doctors from the neighbouring villages have also been found to attend and in one place the Civil Surgeon brought a number of his medical officers to attend the clinics and learn the methods of diagnosis and treatment.

It is generally found that the survey of one thana occupies one month and when the survey officers pass on to another place, the district authorities supply a doctor who had been trained in leprosy work to carry on the clinic. A list of lepers in various villages is supplied to this doctor and he is able to supplement the survey by noting down the names of new patients who appear for treatment.

The survey was begun experimentally in the Manbhum District of Bihar and Orissa, the Manbazar and Raghunathpur thanas being surveyed. Then the Onda and Gangajalghati thanas of the Bankura District of Bengal were surveyed; thereafter, three areas in the Sonthal Parganas, and the end of the year found the survey party in the Chin Hills of Burma. In the first three districts, the incidence of leprosy was found to be between 4 and 5 times that given by the census figures; but it cannot be claimed that even this survey has revealed the total incidence as second visits to certain villages generally resulted in the discovery of even more cases. Much help was received everywhere from District Magistrates, Civil Surgeons, District Board Officers, District Health Officers and others. In Deoghur thana, the figures reported by the village police gave 30 cases, whereas the expert survey of a quarter of the thana revealed 274. In one high school, eleven cases of leprosy were found among 300 boys.

The areas surveyed and the proportion of the population examined are still too small to enable any general conclusions to be based upon them; nevertheless they tend to confirm the belief expressed in the last year's report that there are at least half a million people in India suffering from leprosy.

So successful have the Propaganda-Treatment-Survey centres proved that the Bengal Branch of the Association is making efforts to begin a provincial survey on similar lines by appointing a band of survey doctors to work in Bengal, and it is hoped that other provincial branches will adopt the same method of dealing with leprosy. The scheme entails the initiation of such centres in two or three thanas of every district where leprosy is common, to be carried on by specially trained doctors supplied by the district authorities. In this way, every district would have model clinics which, besides furnishing more accurate figures regarding endemicity, would demonstrate the possibilities of leprosy treatment, serve as centres of popular propaganda and help to train local doctors. The method adopted in some places of sending anti-leprosy drugs along with literature to existing Government or District Board Dispensaries and expecting untrained doctors to carry out leprosy treatment is to be deprecated. The treatment when thoroughly understood is not difficult to carry out, but it is generally found that special training of doctors is necessary if they are to obtain good results and attract patients.

It is hoped that during 1928 it will be possible to have a survey carried out in the province of Assam, the Central Provinces and the Bombay Presidency.

Other activities of the Central Committee were those which form its special charge, namely:—

- (1) Research into the various phases of the disease and into the methods of diagnosis and treatment;
- (2) Training of doctors at the Calcutta School of Tropical Medicine in the diagnosis and special treatment of leprosy; and
- (3) Publication of material with a view to propagating a true knowledge of the disease, its treatment and prevention, both for medical men and the laity.

RESEARCH.

Research has been carried on, as before, in the School of Tropical Medicine and Hygiene, Calcutta under Dr. E. Muir, M.D., F.R.C.S.

Considerable progress has been made during the year in the treatment of leprosy, the most important advance

being the adoption of potassium iodide. The effect of this drug in leprosy had been known for a long time but the marked reactions caused by ordinary doses in the best known types of leprosy had led to its being considered dangerous and harmful. The clinical and pathological study of large numbers of cases at the Calcutta School of Tropical Medicine led to a new classification of leprosy, and with the aid of this classification certain types and phases of the disease were found to benefit from this treatment, while certain precautions had to be taken in the treatment of others. Not only has the period of treatment been shortened but the workers in Calcutta have found in iodides a much more accurate means of diagnosis of early and doubtful cases and a more reliable test of the extent of the elimination of the disease in cases in which all active signs have disappeared under treatment. The diagnostic value of iodide has also been enhanced by the conjoined use of the blood sedimentation test.

Dr. Henderson, who was appointed by the Indian Council last year as an assistant of Dr. Muir, has been making a careful microscopic study of the early lesions of leprosy, a work which needed thorough investigation, most pathologists having in the main confined their energies to the examination of the more advanced cases. Interesting results have already been obtained.

Four special courses of instruction in leprosy were held at the School of Tropical Medicine and Hygiene, two of these being in February and two in November. One hundred and four doctors attended these courses of whom one hundred came from the following provinces and states:—

Punjab	..	..	..	..	2
Madras	..	..	..	..	8
Bihar and Orissa	..	..	..	..	14
Central Provinces	..	..	..	..	30
Bengal	..	..	..	..	17
Burma	..	..	..	..	6
Bombay	..	..	..	..	1
Assam	..	..	..	..	6
United Provinces	..	..	..	..	3
Western India States	..	..	..	..	12
Central India	..	..	..	..	1

100

One doctor was sent from Egypt, two from West Africa and one from Greece by their respective governments to study leprosy before acting as leprosy experts in those countries.

Each course lasts a fortnight and consists of lectures, practical demonstrations with opportunities for practice in diagnosis, differential diagnosis, pathological study and treatment. An examination is held at the end of each course and a certificate is granted to those who pass.

As some of these doctors are themselves teachers in medical schools, whole-time workers in leprosy and propaganda officers, far more training has resulted from these courses of lectures than the figures suggest. One of the doctors alone, Dr. B. N. Ghosh, since completing this course in February 1927, has conducted intensive six-day courses in leprosy attended by over 200 doctors in various districts of Bengal.

In the last three years, 184 doctors have been trained at the School of Tropical Medicine and Hygiene, Calcutta, and although the achievement coupled with the special training which these doctors have in their turn imparted to others, is satisfactory, it is much short of the ideal, namely, that each district should have a sufficient number of trained doctors to ensure that a leprosy patient may not have to travel any great distance to obtain treatment.

The main key to the situation therefore lies in the ability of the local doctor to administer efficient treatment in cases of leprosy coming to his notice. If early cases come under treatment and, as is expected, a cure is effected, it would not only encourage lepers to seek medical aid more readily but would at once begin to dispel much of the popular prejudice against the leper, who would receive more care and attention from his own people than has hitherto been his lot.

As in the previous year, practically all the doctors deputed to Calcutta have been members of Provincial and Subordinate Medical Services. While doctors from this class are always welcome to the classes the Indian Council would like to see private medical practitioners also availing themselves of this training which is given without any cost.

PROPAGANDA.

A steady demand for propaganda material, which was further supplemented during the year, has been maintained. These demands have been received both from doctors and laymen, in India and abroad.

Dr. Muir's pamphlet "Leprosy: Diagnosis, Treatment and Prevention" has been the most popular necessitating the publication of a further edition of 4,000 copies. The edition has been fully revised to bring the information of subjects dealt with in it up-to-date.

The "Popular Lecture on Leprosy" illustrated with 55 pictures and a set of slides corresponding to these pictures has also been much in demand. The book has been issued gratis but the slides were sold at Rs. 60 per set packed in a suitable box. This book which was published in 1926, has gone through its second edition during the year under report.

APPENDIX II.

Leprosy Survey: March—November, 1927.

Thana surveyed.	District and Province.	Population.	Number of villages surveyed.	Number of villages affected.	Total Lepers (Chowkidars' Census).	Total Lepers (Expert Census).	Ratio Chowkidar Expert.	Total patients attending treatment centre.	Castes chiefly affected.	Period of survey.
Manbazar.	Purulia (B. & O.).	97,504	347	188	237	633	1 2.7	170	Bauri. Kurmi.	March April.
Raghunathpur.	Purulia (B. & O.).	70,731	197	124	183	892	1 4.9	250	Bauri. Kurmi.	May.
Onda.	Bankura (Bengal).	66,862	285	203	246	919	1 3.7	361	Bauri. Gowala. Teli. Brahmin.	July.
Gangajalghati.	Bankura (Bengal).	49,991	178	142	276	1,005	1 3.6	212	Bauri. Teli. Sudhi. Gowala.	August.
Jarmundi Centre including Haripur Circle.	Sonthal Parganas (B. & O.).	50,624	526	119	70	328	1 4.7	256	Ghatwals. Kheturias. Khetries. Paharias. Santals.	September.
One quarter of Deoghur.	Sonthal Parganas (B. & O.).	30,000 (approx.)	314	78	30 Deoghur. for whole Thana.	274 For qtr. of Deoghur Thana.	1 9 (Uncorrected.)	70	As in Jarmundi Centre.	October.
Hiranpur Police Station and Hiranpur Bungalow.	Sonthal Parganas (B. & O.).	40,754	163	106	58	478	1 8	290	As in Jarmundi Centre.	November.

"What the Public should know about Leprosy," another illustrated booklet, which was published late last year, has proved so popular that it has become necessary to publish it in ten different vernaculars, namely:—

Bengali, Assamese, Hindi, Urdu, Tamil, Telugu, Marathi, Gujrati, Malayalam and Oriya.

The Burma Provincial Branch is contemplating the publication of a Burmese edition.

A set of 12 charts illustrating the different phases of the disease, its prevention and treatment, was nearing completion when the year ended.

A new book containing six technical lectures, on leprosy illustrated with 105 pictures was also in the process of being printed at the end of the year. This book which is further illustrated with slides corresponding with its pictures, will be of great help to the doctors wishing to make a further study of leprosy and its special treatment.

The film on leprosy is continuing to be used extensively. Two copies of the film were sold during the year and one was sent to the International League of Red Cross Societies, Paris. Writing in regard to the film the Secretary General of the League said:—

"It was found very interesting by the many different persons who had the opportunity of seeing it. This film was for us an exceedingly good demonstration of the propaganda methods utilized in India and gives a better understanding of your problems."

The most noticeable feature of the work in the provinces has been the establishment of leprosy clinics for the most part in connection with existing hospitals. For an extension of this work, trained doctors are required, and the Central Committee will be glad to arrange for the training of a larger number of doctors each year than it has hitherto done if the Provincial Committees are able to secure their deputation to Calcutta. Assam and the Central Provinces have achieved the largest measure of success in opening these clinics, a result which may probably be ascribed to the fact that these Branches have sent for training the largest number of doctors. Bombay, Bihar and Orissa, Madras and the United Provinces Branches have also made good beginnings in this respect.

ANNUAL REPORT ON THE HOSPITALS AND DISPENSARIES UNDER THE GOVERNMENT OF BENGAL FOR THE YEAR 1926. BY MAJOR-GENERAL G. TATE, K.H.S., I.M.S., CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT. PRICE, RS. 7-12.

This report deals as usual with (a) institutions in Calcutta city; and (b) institutions outside Calcutta.

In Calcutta, there were 33 hospitals and dispensaries in operation during the year, with a total of 3,145 beds available. The improvement in these figures over those for the previous year is chiefly due to the opening of a new 32-bed ward at Howrah General Hospital. During the year, 553,521 in-patients and out-patients were treated, the newly opened Sashi Bhushan Neogy Dispensary at Natherbagan having treated 17,155 persons. The average number of patients per nurse in the various large hospitals in Calcutta varied from 2.51 patients per nurse in the Presidency General Hospital to a corresponding figure of 26 at the Campbell Hospital.

The year was notorious for a severe outbreak of cholera which occurred from January to June. A total of 1,915 in-patients was treated, of whom the Campbell Hospital dealt with 1,559—despite the fact that there are only 29 beds in its cholera ward. This accommodation the Surgeon-General holds to be quite inadequate to the needs of the city, but arrangements for rapid temporary expansion are very good. The attendance figures for kala-azar showed some falling off; 9,947 patients as against 11,228 in the previous year, but every hospital in Calcutta still continues to record a large number of patients treated annually. Malaria was responsible for the attendance of 49,893 patients, and is now generally treated by a cinchona febrifuge prescription rather than quinine. Small-pox was unimportant during the year, and influenza sporadic only. Beri-beri,

however, rose to epidemic status, and no less than 6,810 patients were treated in the different hospitals, with 165 deaths. Pulmonary tuberculosis appears to become worse and worse with every successive year in Calcutta; the figures being 4,117 attendances for 1926 as compared with 3,904 in 1925. There is a tuberculosis ward for European patients at the Presidency General Hospital, but for Indian patients the only accommodation available is a ward of 16 beds for males and 8 for females on the roof of the Medical College Hospital. The entirely inadequate provision for treatment of the almost innumerable sufferers from this disease in Calcutta has been an open reproach to the city, for many years and any philanthropist anxious to deserve well of the thousands of sufferers from this disease in Calcutta might well have his attention drawn to this terrible and distressing problem. As matters stand at present a diagnosis of pulmonary tuberculosis in a middle class Bengali clerk or an Indian workman in Calcutta is almost equivalent to a death sentence. Venereal disease, again, is one of the scourges of the city and was responsible for 21,625 attendances.

Surgical operations in Calcutta hospitals totalled 50,191, of which cataract extractions and laparotomy for conditions other than obstetrical head the list. Receipts amounted to Rs. 30,67,376, of which Government found Rs. 18,95,645, or 62 per cent., whilst a sum of Rs. 5,37,905 was collected from private patients, subscriptions, and donations. New buildings and extensions were responsible for much of the expenditure during the year.

Eighty-one patients in all were dealt with at the mental observation ward, Bhowanipore, during the year, of whom 57 were certified as insane and transferred to Ranchi. Six others were treated at the insane ward of the Albert Victor Hospital for leprosy, Gobra.

District Hospitals and Dispensaries.—Outside Calcutta city, the year saw the total number of hospitals and dispensaries increased by 30, the total being 1,062. In addition 43 homœopathic and 11 Ayurvedic dispensaries were at work during the year. The total number of patients treated at the allopathic dispensaries during the year was 7,788,457, whilst 5,444 beds were available in the *mofussil* institutions. Malaria heads—the list of diseases in the *mofussil* with 2,115,764 attendances; influenza was slightly prevalent with 68,753 attendances; cholera showed an increase on the previous year's figures, and the small-pox epidemic of 1925 persisted on into 1926. As a result of the activities of the British Empire Leprosy Relief Association, reflected in the greater attention which is now being paid throughout India to the diagnosis and treatment of leprosy, the figures for this disease show a marked advance on those for 1925; 2,661 patients in all treated during the year. Surgical operations in all numbered 139,246, an increase of nearly 4,000 on the 1925 figures. In this connection it is interesting to note that, whereas in Calcutta city the chief selected surgical operations are for cataract, and laparotomy for non-obstetrical causes, in the *mofussil*, most of the selected operations are for cataract, but operations on bones come second (perhaps most of them being for compound fractures), and abdominal sections low down on the list. Abdominal surgery is clearly more a matter for the big hospitals of the big cities in India than for *mofussil* dispensaries.

Correspondence.

BLEEDING OF THE GUMS AFTER QUININE ADMINISTRATION.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case perhaps presents a point of interest:

Mrs. A., aged 28, was delivered of a healthy child. The next day she had fever, a temperature of 101°F., with rigor. On the second day the temperature was

101°F. in the morning, and 103°F. in the evening. There was no abdominal tenderness or rigidity, and the lochial discharge was normal. The uterus was well retracted and not tender on palpation.

On the third day the temperature in the morning was 100°F., and she took a first dose of 5 grains of quinine that morning, followed by a second similar dose three hours later. Soon after the second dose profuse bleeding commenced from the gums, and I was called in to see her. Both surfaces of the gums were involved; there was no rash, and no bleeding from elsewhere (except the normal lochial discharge).

I gave a mouth wash of iced water, alum and hydrogen peroxide in succession with very little effect. Calcium lactate, 15 grains, dissolved in water was given orally every two hours. Tincture ferri perchloride applied locally had a temporary effect only. Stypticin was applied locally and two tablets were given to swallow every three hours. The bleeding finally ceased eighteen hours after its onset.

A year previously, the patient had had a similar attack of bleeding from the gums after taking a dose of quinine. This lasted for twelve hours. At that time she was not pregnant, nor had she been recently delivered.—Yours, etc.,

JAGDISH RAI, M.B., B.S.

MANDI,
ROHTAK,
15th May, 1928.

THE COMPOSITION OF PLASMOQUINE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The I. G. Pharma "Bayer-Meister-Lucius," Works Elberfeld, issues the following statement:

As the research work on the new synthetic compounds, to which Plasmoquine belongs, was brought to a conclusion, we can publish the exact composition of the said remedy. The effective part of all Plasmoquine preparations is a base of the chinolin group, namely, the N-diethyl-amino-isopentyl-8-amino-6-methoxy-chinolin. The therapeutically inefficient acid residue only is different in the different Plasmoquine preparations. In the ampoules there is the water-soluble hydrochloric salt of the said base, whereas the tablets contain a salt only difficult to dilute. However, to bring the statement of dosage on a common denominator, the said statement is always calculated with reference to the monochlorhydrate of the said base.

The inventors, Dr. Schulemann, Dr. Schoenhoefer and Dr. Wiegler, will publish exact chemical information in due time in the chemical press.—Yours, etc.,

DR. OSWALD URCHS, M.D. (Prague),
Medical Adviser to:
Messrs. Haverco Trading Co., Ltd.,
Pharmaceutical Dept., "Bayer-Meister-Lucius."

Service Notes.

APPOINTMENTS AND TRANSFERS.

The services of Major A. C. L. O'S. Bilderbeck, I.M.S., are placed permanently at the disposal of the Government of Burma, with effect from the 22nd June, 1928.

Major W. J. Webster, M.C., I.M.S., an officer of the Medical Research Department, is attached as a Supernumerary Officer to the Haffkine Institute, Bombay, with effect from the date on which he assumes charge of his duties.

On relief by Major Khan, I.M.S., Major N. S. Jatar, I.M.S., is appointed to the executive and medical charge of the Jubbulpore Central Jail.

Major L. H. Khan, I.M.S., is appointed to the executive and medical charge of the Nagpur Central Jail, from the date he assumes charge.

Major C. J. Stocker, M.C., M.D., I.M.S., Civil Surgeon, Hoshangabad, is appointed to be Civil Surgeon, Pachmarhi, from the 1st April to the 30th June, 1928.

The services of Major J. P. Huban, O.B.E., I.M.S., an Officiating Agency Surgeon, are placed at the disposal of the Government of India in the Department of Education, Health and Lands.

Captain H. W. Mulligan, I.M.S., is appointed temporarily to the Medical Research Department and is posted on foreign service under the Indian Research Fund Association, with effect from the 7th May, 1928.

The undermentioned officers are appointed temporarily to the Medical Research Department and posted as Supernumerary Officers to the Central Research Institute, Kasauli, with effect from the dates on which they assume charge of their duties:—

- (1) Captain R. W. H. Miller, I.M.S.
- (2) Lieutenant M. L. Ahuja, M.D., I.M.S. (T.C.).
- (3) Lieutenant S. M. K. Mallick, I.M.S. (T.C.).

Colonel J. Norman Walker, I.M.S., Inspector-General of Civil Hospitals, Central Provinces, is appointed to act as Director of Public Health, Central Provinces, in addition to his own duties during the absence on leave of Lieutenant-Colonel H. G. Stiles Webb, or until further orders.

The Viceroy and Governor-General has been pleased to make the following appointment on His Excellency's personal staff, with effect from the date specified:—

To be Honorary Surgeon.

Colonel L. J. M. Deas, M.B., F.R.C.S.E., I.M.S., vice Lieutenant-Colonel R. Kelsall, D.S.O., M.D., I.M.S., vacated. Dated 9th July, 1928.

Lieutenant-Colonel J. W. Watson, C.I.E., I.M.S., an Agency Surgeon, on return from leave, is posted as Civil Surgeon, Ajmer, and Chief Medical Officer in Rajputana, with effect from the 12th July, 1928.

The services of Lieutenant-Colonel J. M. A. Macmillan, M.D., I.M.S., Civil Surgeon, Simla (East), are replaced at the disposal of the Government of the Central Provinces, with effect from the 1st May, 1928.

In supersession of the previous orders of the Department of Education, Health and Lands, dated the 9th February, 1928, Lieutenant-Colonel R. W. Anthony, M.B., F.R.C.S.E., I.M.S., Officiating Surgeon-General with the Government of Bombay, is confirmed in that appointment, with effect from the 11th January, 1928.

Major C. M. Ganapathy, M.C., I.M.S., is confirmed as Health Officer, Simla, with effect from the 1st November, 1927.

Subject to His Majesty's approval, the undermentioned officers have been appointed permanently to the Indian Medical Service as Lieutenants by the Right Hon'ble the Secretary of State for India. Their commissions will bear dates as specified against their names:—

Wajid Ali Khan, M.B. (Lieut., I.M.S.T.C.). Dated 2nd August, 1927. (Previous service as a temporary officer in the Indian Medical Service from 10th May 1926 to 1st August 1927 counts for pay, pension and promotion.)

Surendra Nath Lahiri, M.B. (Lieut., I.M.S.T.C.). Dated 2nd August, 1927. (Previous service as a temporary officer in the Indian Medical Service from 27th August 1926 to 1st August 1927 counts for pay, pension and promotion.)

Shankar Sahai Bhatnagar, M.B. Dated 2nd August, 1927.

Bijeta Chaudhuri, M.B. Dated 2nd August, 1927.

Harnand Lal Batra, M.B. Dated 2nd August, 1927.

Priya Nath Lahiri, M.B. (late Captain, I.M.S.T.C.). Dated 2nd August, 1927. (Previous service as a temporary officer in the Indian Medical Service from 27th August 1917 to 31st August 1925 counts for pay, pension and promotion.)

Leonard George Backhurst (Assistant Surgeon, I.M.D.). Dated 10th November, 1927. (Previous mobilized service as a Warrant Officer from 16th November 1916 to 9th November 1927 counts in full for pension.)

Birendra Nath Hajra, M.B. (late Lieut., I.M.S.T.C.). Dated 10th November, 1927. (Previous service as a temporary officer in the Indian Medical Service from 11th February 1924 to 10th February 1925 counts for pay, pension and promotion.)

LEAVE.

Lieutenant-Colonel G. D. Franklin, C.I.E., O.B.E., I.M.S., an Agency Surgeon, is granted leave on average pay for 8 months combined with leave on half average pay for 1 month, with effect from the 12th July, 1928.

Leave for 1 year is granted to Lieutenant-Colonel H. G. Stiles Webb, I.M.S., Director of Public Health, Central Provinces, with effect from the 2nd May, 1928.

Lieutenant-Colonel J. W. McCoy, I.M.S., Civil Surgeon, Sylhet, is allowed leave on average pay for 4 months and 15 days, with effect from 30th June, 1928, or any subsequent date on which he may avail himself of it.

Lieutenant-Colonel B. B. Paymaster, I.M.S., is granted leave, preparatory to retirement, on half average pay for 6 months and 30 days in continuation of the leave already granted to him.

Lieutenant-Colonel K. G. Gharpurey, I.M.S., is granted leave on average pay for 7 months, with effect from the 15th June 1928, or date of relief.

Lieutenant-Colonel J. M. A. Macmillan, M.D., I.M.S., Civil Surgeon, Simla, East, is granted leave on average pay for 8 months combined with leave on half average pay for 10 months, with effect from the 1st May, 1928.

Major E. S. Goss, M.C., I.M.S., Officer-in-charge, Medical Store Depot, Lahore Cantonment, is granted 60 days' privilege leave, with effect from the forenoon of 5th June, 1928.

PROMOTIONS.

The promotion to his present rank of Major K. S. Master, M.C., M.B., I.M.S., notified in Army Department Notification No. 1031, dated the 20th August, 1927, is antedated from the 10th August, 1927 to the 10th February, 1927.

Captains to be Majors.

B. Sahai. Dated 21st May, 1928.
M. L. Bhargava. Dated 5th June, 1928.
D. V. O'Malley. Dated 8th June, 1928.
T. R. Khanna. Dated 20th June, 1928.
Som Dutt, M.C. Dated 24th June, 1928.

Lieutenant to be Captain.

Priya Nath Lahiri, M.B. Dated 2nd August, 1927, but to rank from the 28th July, 1922. Grading after allowing for break in service.

RETIREMENTS.

His Majesty the King has approved the retirements of Captain R. T. W. Stoney, I.M.S., with effect from the 10th May, 1928, receiving a gratuity and of Lieutenant-Colonel H. C. Keates, M.D., I.M.S., with effect from the 3rd June 1928.

NOTES.

ANTIPHLOGISTINE IN PNEUMONIA.

PNEUMONIA is pre-eminently a disease in which prevention is better than cure. Although much can be accomplished by rational treatment, a high mortality persists in spite of all forms of medication.

Very many cases of pneumonia follow in the wake of influenza, bronchitis, or even an apparently innocent upper respiratory tract infection. The pneumococcus, it has been proved, finds it difficult to penetrate the healthy mucous membrane of the bronchial tube and alveoli; but, when this membrane has already been damaged by bronchitis or influenza, the micro-organism gains a foothold and pneumonia may be the result.

The best time to treat pneumonia is before it develops. If every attack of bronchitis or influenza were handled as a potential case of pneumonia, there would be far fewer actual cases.

By relieving internal congestion, by stimulating the superficial blood flow, by increasing the phagocytic

power of the protective white blood cells, and by restoring normal circulation in the inflamed bronchial tubes and alveoli, Antiphlogistine has proved itself an invaluable auxiliary to the physician practising modern preventive medicine.

WATSON'S MICROSCOPE RECORD.

THE quarterly *Microscope Record*, published by Messrs. Watson and Sons, Ltd., 313, High Holborn, London, W. C. 1, continues to be a journal of great interest to laboratory workers and microscopists. In a recent issue received—that for January 1928—Mr. T. Thorne Baker deals with the subject of contrast filters in microphotography; this is an article of special value on account of the table which it includes of the most suitable contrast filters for use with the commoner microscopic stains. Dr. F. J. Brislée, D.Sc., F.R.M.S., deals with micrometry; this short article describes the use and standardisation of the eyepiece micrometer, and also the use of the stage micrometer. Watson's "Binar" is a small but interesting instrument described; it is a combined telescope and magnifier only 15/16ths of an inch long, costing 17s. 6d. For viewing distant objects the draw tube gives a magnification of 2½ diameters; for close work the object glass alone is used, and gives a magnification of 6 diameters. Mr. G. T. Harris of the Quekett Microscopical Club continues his series of articles on the Desmidiaceae. A section of the number is devoted to metallurgical work, and suitable models of microscopes for such work. Other articles deal with the use of the microscope in the paper and other textile industries, whilst the section of answers to correspondents includes many useful "tips." Of special interest is a mounting medium prepared by the British Drug Houses, consisting of a solution of hard Yucatan "elemi" in xylenc, which, it is claimed, is free from the organic resin acids so invariably present in Canada balsam; it is claimed for this mountant that stains which are decolourised by balsam—such as the Romanowsky ones—are well preserved. There is also an account of the different types of objectives issued by Watson and Sons; of these we have frequently used Watson's "Versalic" 1/12th inch oil immersion objective, and have always found it a reliable lens, with clear definition.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

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The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

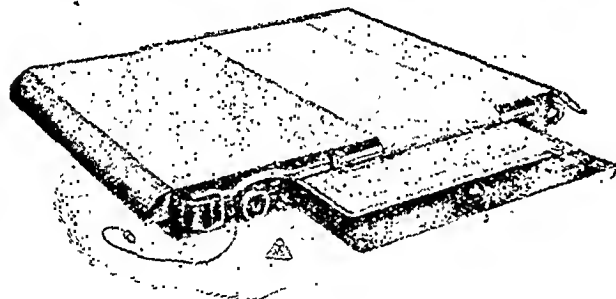
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X-RAY EQUIPMENT



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Original Articles.

A DISCUSSION ON THE POSSIBILITY OF *ASCARIS LUMBRICOIDES* INFECTION BEING ACQUIRED THROUGH THE SKIN.

By P. A. MAPLESTONE, D.S.O., M.B., Ch.B., D.T.M.

(From the Hookworm Research Laboratory, financed by the Indian Jute Mills Association.)

School of Tropical Medicine and Hygiene, Calcutta.

It is an established fact that infection with *Ascaris lumbricoides* occurs by swallowing eggs containing developed embryos, but owing to certain anomalies that have been noted in the epidemiology of this infection, it seems worth while to consider whether this is the only way in which infection can occur.

The commonest sources of ascaris infection are considered to be green vegetables and drinking water that have been contaminated with faeces containing mature ascaris eggs. There are numerous records of finding ascaris eggs on vegetables, and that of Walker (1927), who traced the high rate of infection in the Singapore garrison to contaminated green vegetables, eaten raw, is a good example. There are also many references in the literature such as that of Isobe (1925), who found ascaris eggs on spinach and cabbage, but these are of little significance, for vegetables of this kind are invariably boiled before being eaten. Certain destruction of the eggs would thus occur for Ogata (1925) has shown that they are very susceptible to heat, being killed in one second in water at only 75°C.

Chandler (1926) quotes the results of faecal examinations in two islands in Bengal, as evidence of water contamination being a prolific source of ascaris infection. In a small island with a single water tank and a population of 92 the water was free from contamination, because the stools were deposited mostly on the outward-sloping banks of the island, and so they were not washed into the tank by rain. Here the infection rate in 66 stools examined was 4.7 per cent. In a larger neighbouring island, however, with several water tanks and a population of 500, many of the tanks showed stools lying on the banks sloping towards them, whence the faecal matter would be washed into the water by rain. In this island 35 stools showed 80 per cent. ascaris infection. This seems conclusive, but only 52 per cent. of the stools from the first island and 85.7 per cent. of the stools from the second island showed hookworm infection, which is clear evidence that soil contamination in the large island is probably much greater; therefore, the contention that the high ascaris rate in the large island and the low ascaris rate in the

small island are solely due to differences in degree of water contamination, is not so definite as at first sight appears. Another fact remarked by Chandler (1928) in the tea gardens of Assam, Northern Bengal, and South-West India, where both hookworm and ascaris infections are very common, was that the ascaris infection rate was approximately the same in gardens where the sole water supply was from heavily polluted surface collections, and in gardens which had tube wells or water borne in pipes from a distance, and therefore free from the suspicion of faecal contamination. The tea garden coolies do not use uncooked vegetables as food to any extent, therefore it must be assumed in the light of present knowledge that contaminated water is the principal source of ascaris infection in these places. In other words, the recognised sources of hookworm infection in the different gardens is the same, whereas the recognised sources of ascaris infection vary, so that one would not expect to find the intensity of infection with these two parasites running a parallel course in all the gardens. Even if it is admitted that coolies with a clean water supply are prone to drink from surface water as well, one would expect to find the partial use of clean water as opposed to the sole use of contaminated water, reflected in a lighter ascaris rate in the former places, but such is not the case. This suggests that there may be other ways of acquiring ascaris infection than by swallowing ripe eggs.

In Penonome, Panama, where human faeces are not used as fertiliser for vegetables, and the drinking water is not polluted, Brown (1927) reports an infection rate of 40 per cent. to 90 per cent. with ascaris, and he found the eggs in the earth floors of huts.

Sasaki (1927) states that the specific gravity of ascaris eggs varies between 22.2 and 11.1 by Baumes scale. Unfertilised eggs are the lightest, and mature eggs are slightly lighter than eggs in which embryos had not yet developed. But whatever their condition, they would sink fairly rapidly in water and would remain at the bottom of a tank, unless carried to the surface entangled in floating matter. Therefore, unless the water was so shallow that the act of dipping from a tank caused the sediment to rise so that some of it entered the vessel or the cupped hands, there would not be much likelihood of ascaris eggs being ingested in this manner.

Swellengrebel (1913) found that ascaris eggs would hatch in water after a period of about three months if they were kept free from bacterial growth. Swellengrebel claims that this is the first record of ascaris eggs hatching outside the animal host. Although this observation is possibly of considerable importance, it seems to have attracted little attention, for it is not until Kondo (1920) reported the hatching of ascaris eggs in soil in about seventy days that any further reference to the hatching of

these eggs in the free state, can be found. Kondo was evidently unaware of Swellengrebel's work for he claims his observation as the first record of ascaris eggs hatching outside the body. This Japanese worker carried the work through a further important stage, for he found that larvæ hatched in this way could live in moist soil for at least a month, and that when they were smeared on the skin of a guinea-pig they were found in the lungs of this animal at a later date. This work was confirmed by Kondo (1922) and Asada (1921). Hirasawa (1927) hatched *Ascaris lumbricoides* eggs in an artificial medium (the nature of which is not given in the summary) and although subsequent development in the free state was not apparent, he succeeded in infecting laboratory animals with these larvæ administered by the mouth. He found that the same course of migration occurred in these animals as when ripe eggs were swallowed. Similar observations were made by Asada (1925). None of this work by Japanese investigators has yet been confirmed in other parts of the world as far as the writer can ascertain. They apparently have some special method of bringing about the hatching of ascaris eggs, which has not been published, except possibly in the original Japanese, and consequently it is not available to the majority of workers. The writer is of the opinion that certain special ways of making successful cultures must be necessary, for from a considerable number of tentative experiments in which ascaris eggs have been placed in tubes of water or on moist soil, only a few eggs out of a large number in one tube of water hatched, the reason for this partial success and numerous failures not being apparent. In confirmation of this, Ransom and Foster (1919) state: "Some writers have found that hatching will occur outside the body if the eggs are placed in certain solutions. We have been unable, however, to cause more than a very small percentage of eggs to hatch outside the body in vitro. The factors which bring about the hatching of eggs have not yet been determined."

Stewart (1916 and 1918), by feeding experiments on mice with ripe ascaris eggs traced the larvæ of *A. lumbricoides*, and *Toxacara mystax* to the cæcum, the route being via the lungs, trachea, oesophagus, etc. They had undergone a certain amount of development, but were soon voided in the feces as the host was unsuitable. Stewart's work was confirmed by Ransom and Foster (1919), and by using a young kid and a lamb they found worms in the intestines of these animals in a much more advanced stage of development than one can get in rats, guinea-pigs, etc. They regard this as evidence that the larger animals are of an intermediate degree of host suitability between man and the smaller animals. These workers quote Martin (1913), who made eggs of *A. vitulorum* hatch by placing them under the skin of guinea-pig, and they carried his work a step further by repeating the

experiment, and by subsequently finding the larvæ in the lungs.

Fulleborn (1921) has shown that larvæ of *A. lumbricoides* are disseminated by the blood stream, and that they reach the arteries from the veins, via the capillaries. In the case of *Toxacara canis*, he found puppies 3 to 4 days old infected with larvæ 2 to 3 weeks' old. Similar findings have been recorded in the case of hookworms, for Howard (1917) discovered hookworm eggs in the stool of a child 14 days old, and Adler and Clarke (1922) frequently found mature *Ancylostoma caninum* in puppies from 5 to 15 days' old. This indicates that once the larvæ of *T. canis* have gained entrance to the body of a host they are capable of behaving in a similar manner to the larvæ of ancylostomes, and it seems reasonable to assume that the larvæ of *A. lumbricoides* can do the same.

CONCLUSION.

Consideration of the above facts suggests that under conditions not yet generally understood, the eggs of *A. lumbricoides* can hatch in moist soil and that the larvæ can live in this medium for at least a month. After hatching they are probably capable of penetrating the skin and reaching the lungs, whence they would almost certainly migrate to the intestines and reach full development in the human being.

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REPORT ON THE INVESTIGATION OF AN OUTBREAK OF EPIDEMIC DROPSY IN SURADA, A VILLAGE IN GANJAM DISTRICT.

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Geographical situation.—The village is situated about 47 miles north-west of Berhampur and is reached by road. Together with Boradi and Motto Sahi villages it forms the Union of Surada with a total population of about 4,000. All the three villages lie on the southern bank of the Rushikulya river, between the river on the north and the Surada reservoir on the south. At first a small village, it has gradually developed into an important centre of agency trade, being one of the gateways to the Ganjam agency and the headquarters of the Deputy Tahsildar and of all the sub-offices of various departments. Though it does not come under the agency proper, it is surrounded on three sides by the agency. It has highly malarious villages on all sides and is itself malarious. There is practically no cultivation around the three villages.

The soil is alluvial almost throughout the whole village site except where the new public offices and quarters for officers are built. Here the soil is red earth mixed with gravel.

The sub-soil water level is generally high, being about 6 to 8 feet from the surface. It is water-logged in the rainy season, being surrounded by the flooded rivers and the reservoir. The village generally slopes from south-west towards north-east and the drainage of the village goes into the river Rushikulya.

General sanitation.—In spite of the existence of a union, the sanitation of the village is very bad. Besides the huge reservoir on the south, there is a big disused irrigation tank close to the village which is full of water-hyacinth. They serve as breeding-places for mosquitoes.

Water-supply.—The water-supply of the village is the river which is badly polluted. Only three fresh-water wells exist, two near the officers' quarters used solely by them, and one in the mission quarters.

Conservancy is very bad. There is no night-soil conservancy to speak of and the rubbish conservancy is very much neglected. To add to this insanitary condition, the union administration has been at a stand-still since September 1925.

The climate of Surada.—Like all other interior villages in the district, the climate of Surada is very hot and sultry in summer and cold in winter and the rainfall during the monsoon is heavy.

Previous history of the epidemic.—Every effort has been made to enquire into the early history of the epidemic, but except in one instance no definite information could be obtained as to when the disease first made its appearance. The earliest case in the village seems to have been a Tamil midwife who was attached to the local dispensary. The only definite information that could be relied upon is from the present dispensary midwife. From her was obtained the information that her husband was one of the first victims of the disease. She states that the disease started in the village 19 years ago, a previous Tamil midwife having suffered from "swelling" from which she died about one year after she came to the dispensary. This midwife lived two doors from the present midwife's residence. Next year 6 or 7 persons died of this disease, i.e., swelling of the feet, legs and body accompanied by diarrhoea and dysentery. One of these was her husband. Many others died of the same disease in that year. Three of these are three members of one family, viz., Balla Sahu, Polia Sahu and their mother, all dying within a period of a few days. The midwife and her son who was then about 6 years old also had the disease but recovered. Some 4 families of *dhobies* living in the same street get this disease every year. She herself suffered about 3 or 4 times during these 18 years and her son had the disease twice. Her daughter-in-law suffered from it last year. Others suffer from it every year, but in such cases the swelling is usually slight. The disease has been generally confined to one street only, and there is nothing to show that it has been prevalent anywhere else in the district before or since. The disease generally appears in summer and continues throughout the hot season and subsides at the commencement of the rains. From the fact that this midwife's husband was one of those who died of the disease and from the fact that she is a resident of the locality and reasonably intelligent, her statement may be taken as substantially true.

The first mention of the disease at Surada was by Dr. B. Misro in the Annual Public Health Report of the district for the year 1924. In August 1925, he made a special report to the

Director of Public Health on its prevalence in 1925, and has recorded about 9 cases.

Epidemiology of the disease.—Permanent residents of the village ascribe the disease to various causes, while all agree that the disease was first introduced into the village by the Tamil midwife. The disease was till recently confined to a portion of a street called Paiko Street at the western end of the village and very few cases of this disease were reported elsewhere. In this locality, four *dhobi* families live in adjoining houses and some of these suffer from the disease every summer. Others living in houses in the opposite row have suffered from the disease during the year and are connected with the spread of the epidemic.

About 200 yards from this locality and very close to Jagannathaswami temple, situated about the centre of the village, is a small eating hotel belonging to a woman named Mukti and her son Bhagavan. For the last two years, both these persons have suffered from this epidemic dropsy.

The earliest attacks of the disease occurred among *dhobi* women who had only slight swelling of the feet. About the same time, the hotel-keeper, Mukti, also had a very severe attack, her whole body being swollen while she also had dysentery. All the time she was carrying on her trade with the help of her son who was also attacked later. More than 75 per cent. of the attacks in the present epidemic have been traced to one or other of these two sources.

A. Course of the epidemic in Paiko Street.—Three *dhobi* women living in Paiko Street, aged about 35, 18 and 14, respectively, had slight swelling of the feet accompanied by diarrhoea or dysentery about March last, and were almost better in June when I saw them. Subsequently others in the same locality suffered. They were three Indian Christians employed as teachers in the local mission school. The wife of Chouriappa named Bendi Gitti, aged about 25, and her child 4 years old also had the disease.

A peon in the taluk office living opposite one of the teachers took the infection, and his wife died from the same disease about 15th October.

Infection in the Spanish Mission.—To the west of Paiko Street and separated from it only by a road is the Spanish Mission and boarding school. There have been no attacks inside the mission, the buildings of which stand in a large compound. The mission is run by 5 European priests and one European mother and the school has separate male and female sections. The male section houses about 45 boys in two sub-sections, the agency section for boys of Khond and Savara castes and the plains section for boys of Oriya castes. The former have separate lodging and boarding, while the latter have separate lodging. The mess is common for boys and girls. One kitchen is common to both Europeans and Oriyas, but food is separately prepared. The girls cook for themselves, for the

Oriya boys and for the European priests. A separate kitchen is kept for agency boys. A fresh water well inside the mission compound is used for the common kitchen, but water from the river is never used. On the other hand, the agency boys always use river water for drinking and cooking purposes. The mission has kept absolutely free from the epidemic up to 1926. The mission inmates, however, very rarely come in contact with the people in the village, the only persons who have anything to do with the mission being four teachers and about half a dozen servants who live in Paiko Street. These servants have been in the service of the mission for a number of years, but neither they nor the teachers had ever suffered from the disease. During the last summer season, three teachers, Chouriappa, Anthony and Sebastian were, however, attacked. In the early stages, when diarrhoea or dysentery appears, the effects of the disease are slight and the patient is not incapacitated. The first to be attacked was Chouriappa. He continued to work in the school until he fell sick. Then the other two teachers suffered and afterwards the disease spread to the inmates of the mission. The Revd. J. G. Gnennes, the head of the mission at Surada, was one of the first to be attacked. Finally, all the European priests and about 20 out of some 22 boys getting their food from the common kitchen, suffered from the disease. The "infection" spread to the female section also and among those of the common boarding section all suffered except 5 (3 girls and 2 boys), and four deaths occurred. One peculiarity of the epidemic among the mission inmates is that among the 20 agency boys who have separate boarding and mess and use a separate water-supply, not a single one was attacked although they study, pray and play together.

Taluk Office.—The taluk peon, Jhon Leo Sing, even when he was suffering from the disease, continued to work in the taluk office. Gurnath Dass, an attendant of the same office, got the "infection" and though he had almost recovered in June, he got a relapse and died before my second visit in September. Further, I understand from the medical officer that the taluk head clerk and one or two other clerks in the taluk office suffered from slight swelling of the feet. Besides these who can be connected with the spread of the disease, others in Paiko Street suffered from the disease during the year, e.g., Anthony aged 24 and his wife Sabince, aged 16; Bastinamma wife of Anthony Pillai, aged 50; and R. V. Ring Rao and his wife. The last two came to Surada about 22nd June and put up in the same street. They had severe diarrhoea and dysentery and after about one month both of them got cedema of the body; they are now recovering.

B. Course of the disease among the inmates and boarders of the hotel.—The second source of infection is the hotel-keeper, Mukti and

her son Bhagavan. She was the first sufferer from the disease in this locality during the year. The hotel is a most insanitary and ill-ventilated thatched hut, lying in the most insanitary surroundings. But for want of a better, all persons going to Surada on business or duty have to take their food in this hotel. As stated already, this woman got the disease about April 26th, and suffered very badly. About a month later, her son got the disease in a mild form. The hotel business was carried on in spite of sickness. One of the earliest of the boarders who got the disease was one Somanath Patnaik, a clerk in the office of the local Sub-Registrar. He was transferred to Surada from Russellkonda in December 1925, and got the disease in the first week of May 1926. Owing to his sickness, he went on leave in July and was succeeded by one Govindo Patnaik. The latter also had to take his food in the same hotel. Soon after he came to the village, he also suffered from the disease and has at present slight œdema of the legs.

2. One P. V. Krishna Rao also came to Surada about January 1926. He was boarding in the same hotel and noticed the swelling of the legs on or about 7th June last. He is a clerk under an agent of a tea estate in the agency, whose office is held in the agent's house in Surada.

3. Another boarder of the hotel was the late local postmaster, named M. Viswanath Patnaik. He was messing in this hotel and lodging in the post-office quarters. He suffered from the disease and has gone on leave.

4. Two range clerks and one depôt clerk in the range office at Surada, who were and are messing in the hotel, all had attacks of the disease.

5. Close to this hotel there is a lodging house for the school boys of the local school. They have to make their own arrangements for food. Some cook their own food, while a few others go to the hotel. Of the three boys who messed in this hotel two, namely, Godavari Tyadi and Trimath Das, suffered from the disease while the third has till now escaped. None of the other members of the school house have had an attack.

6. When the new Agency Central Health Range was formed in June last and Surada was fixed as the headquarters of this range, Jagabandhu Patnaik who was Health Inspector, Russellkonda, went to Surada on 22nd July and put up in this school lodging house and had his food in the hotel. He contracted this disease, but his peon and his vaccinators who were also messing in the hotel escaped.

7. Five merchants from Orissa who went to Surada in January last for timber trade, took jointly a rented house in Surada. Three of them have their own mess, while two of them Madhobando Mahanty and Balakrishna Aich were messing in this hotel. Both these men

have suffered from the "infection," while none of the other three got the disease though all five lodge in the same house.

8. A tailor named Arunuru Kondo came to Surada and was messing in the hotel. He too suffered from the disease, but is now having separate messing arrangements.

9. The daughter of the hotel-keeper is married and lives in the village. She very often goes to the hotel and this year she too got the disease, although none of her family seem to have suffered.

10. *Sub-Registrar's Office.*—Subsequent to Somanath Patnaik, clerk, Sub-Registrar's Office, getting the disease, the Sub-Registrar Narasinga Rao was attacked. He was transferred from Berhampur to Surada and took charge on 20th May. He got diarrhoea and dysentery on the 26th and noticed swelling on the 27th. The clerk Govindo Patnaik who acted as substitute for Somanath Patnaik while on leave and who was messing in the hotel also got an attack.

Tea Estate Office.—In the house in which P. V. Krishna Rao was working as a clerk, three attacks occurred. One Panchanan Mahapatro, brother of R. N. Mahapatro, agent of the estate, Heramani Mahapatrini, mother of the above, and Parvati Devi, wife of R. N. Mahapatro suffered from the disease in succession.

Post Office.—After the postmaster got the disease the post peon was attacked, but is now improving. He was residing in Paiko Street. The postmaster went on leave on account of his sickness and was succeeded by one S. Suryanarayana who was transferred here from Parvatipur. He has taken the "infection" and suffers from slight swelling of the feet. He is putting up in the quarters attached to the post office, where his predecessor lived.

M. Subba Rao was the forest ranger, Surada, till July last. He suffered from the disease and consequently went on leave. It has been stated that two clerks working under him and a depôt clerk who were messing in the hotel, suffered from the disease. B. K. Krishna Rao who was posted here as forest ranger in place of M. Subba Rao, put up in the government quarters where his predecessor had lived. This gentleman too has contracted the disease and is now suffering from it.

It has been possible to trace the relation of different attacks from the available information as to the time of onset of the disease in about 88 per cent. of the total number. The other 12 cases are apparently similar as to source of "infection" to those which have been traced.

C. The infection in the following cases has not been traced to either of the two main groups. Infection in the Sub-Inspector's Quarters and Police Lines.

1. The Sub-Inspector of Police, Mahammad Mazahar, who was transferred to Surada in the last week of February, suffered from

this disease in the last week of March or first week of April. Two sisters who are at present living with him, were attacked, became seriously ill, and were bed-ridden for more than a month. Besides the Sub-Inspector, 3 constables had attacks.

2. Police Lines.

(1) Konaro Moliko, No. 411, constable.

(2) Boli Jim, No. 507, constable in the same station reported to have suffered from the disease.

(3) B. Dalayya, acting head constable.

(4) Wife of B. Dalayya.

The Sub-Inspector lives in separate quarters and the constables are put up in the Police Lines.

3. Ramanath Mitra, Sub-Assistant Surgeon, noticed slight swelling of the feet, but beyond that had no other symptoms.

4. Erusula Lachayya, a goldsmith, came to Surada about the 1st week of July. About the 1st week of September he got swelling of the legs with dysentery and fever. His wife and two other members of the family also suffered from the disease.

5. Boroto Kasi Patro and Krishnamoorthi Patro, two Komaties (trading class), came from the agency about the middle of July. Both got swelling of the feet and some days after their father Boroto Challanayya Patro had swelling of the feet and high fever.

6. The wife of Mahammad Usephi and her son aged 6 years, also fell victims to the disease.

THE DISEASE AND ITS SYMPTOMS.

1. *Swelling*.—The characteristic symptom of the disease in every case is swelling of the feet and lower legs, both legs being equally affected. This is generally accompanied by diarrhoea or dysentery and in some cases by fever. In the early stages, puffiness of the dorsum of the feet and pitting of the skin of the legs on pressure over the shins are to be noted.

Influence of exercise and of gravity on the swelling.—This swelling of the feet and legs is least in the morning, increases rapidly as the day advances, and is most marked during the evening. It is more marked when the patient is constantly sitting on a chair with the legs hanging down than if he is moving about. It is still less prominent if he is actively walking or cycling. During the day, the swelling decreases if the patient lies flat on his bed with the legs raised up. It is evident that exercise and gravity play an important part in determining the amount of the swelling. It is also less when the legs are kept in boots and putties or even socks. In mild cases, the swelling does not rise above the calf muscles or the knees. In moderately severe cases, it reaches up to the thigh and extends up to the hip joints; and in severe cases, the swelling gradually involves the abdomen, hands, arms, chest and face and is present over the whole body including the scrotum and penis. In parts of the body where the skin is tender, it becomes soft, tense and translucent as in Bright's disease. In all such cases, the

patient becomes bed-ridden and there is difficulty in breathing. In the early stages, particularly marked in patients with fair skin, the affected parts become pink and erythematous and the skin is tense. The swelling is soft, pits on pressure, becomes pale and anæmic where the pressure is applied, and then fills up gradually and regains its pink appearance. One intelligent patient has observed that the swollen parts sweat. After the swelling has lasted for some time, say a month or more, the skin becomes slightly rough, thickened and less hairy. The natural colour of the skin changes to a peculiar darkish muddy hue. There is no desquamation, but the skin becomes loose and flabby and loses its healthy tone. Here and there darkish patches of discolouration are also seen.

2. *Gastro-intestinal symptoms*.—Diarrhoea or in severe cases dysentery, is the next important symptom of the disease, though it is not present in all cases. Out of 66 cases, whose history has been more or less accurately recorded, 15 had diarrhoea accompanying the swelling and about 21 had diarrhoea or dysentery, 15 days to 1 month after the swelling appeared. Six patients had dysentery and in one the motions were hæmorrhagic in the last stage. The watery diarrhoea in mild cases is slight, but in others it may cause 30 or 40 motions a day. No pain or tenderness is noted in the abdomen. In one fatal case, hæmorrhage from the intestines occurred. One patient noticed that the swelling increased perceptibly when the diarrhoea was stopped by drugs and so he allowed the diarrhoea to go on untreated to keep the swelling down.

Gastric symptoms.—No nausea or vomiting was ever observed in any of the 69 cases whose history was personally enquired into. Of about 102 cases which have come to my knowledge, only 3 or 4 gave a history of vomiting, having eaten articles of food prepared in adulterated oil and they definitely ascribed the vomiting to that cause. No patient complained of loss of appetite and some even took their usual diet when they had diarrhoea. In the absence of diarrhoea, the bowels were normal and a few have noticed even slight constipation. (It must be remembered here that the water-supply of the village is solely from the river. But in summer, the river is dry and people get water by digging small pits in the bed of the river. Diarrhoea due to the river water may generally be excluded in summer. In the rainy season on the other hand, there is generally an epidemic of dysentery in the village due to the freshets in the river. These have been generally excluded from the list.) The tongue, in cases with diarrhoea and dysentery, was pale, flabby and generally coated. In mild cases without diarrhoea or dysentery, it was normal in appearance.

3. *Fever*.—Of 66 noted cases, there was a history of fever in 18 and in 8 the fever was moderate and could not be said to be malarial.

The rise of temperature came on a few days after the swelling appeared. In 6 of the 18 cases, the fever was slight, but came on long after the swelling appeared. Of the 102 cases that came to my knowledge, a definite history of fever has been obtained only in 18, 4 of which were probably malarial.

4. *Heart and circulation.*—Many of the cases found on 24th June 1926, were examined by Major Carrick, the District Medical Officer, and I have also examined a few. No record of examination has been kept. In his report dated 9th July, 1926, he described the heart symptoms as follows: "One case showed a disturbance of heart, but the pulse in most of the cases was weak with low blood pressure. The first sound was weak in most of the cases, even among the European patients." In 3 of the advanced cases, slight dilatation of the heart was noted. The pulse was slow and soft.

Blood.—The physical condition of the blood was observed only in 3 advanced cases with profound anæmia. It was thin and watery and of a pale colour.

Anæmia.—In severe cases with extensive swelling there is profound anæmia and a peculiar muddy colour of the skin. The sclera of the eyes become yellowish brown.

Hæmorrhage under the skin, mucous membranes, etc.—In some of the fair-skinned patients examined, the skin over the swollen parts is erythematous, this colour disappearing on pressure. No petechiæ were noted and no cases had hæmorrhage from nose, throat or mouth. Only one case (Chouriappa) had hæmorrhagic stools, and he died.

5. *Kidneys and urine.*—In no case in which the urine was examined was there even a trace of albumen. None of the patients noticed any great difference in the amount of urine passed. Only one patient noticed that he had to pass urine 5 or 6 times during the night and from a history of itching sensation and thirst I exclude the case as being probably due to diabetes, although his urine was not examined. Only one (Chouriappa) noticed high coloured urine and burning sensation while passing it. There was no increased thirst in any of the patients.

6. *Nervous symptoms.*—Nervous symptoms are rare. There is no numbness or tingling or dragging sensation in the legs; no patches of anæsthesia anywhere and no tenderness in the calf muscles. The knee jerks are present, but in cases of severe dropsy, they are sluggish. (These have not been examined in all mild attacks.) Nothing peculiar about the gait of the affected persons was noticed even in the severe cases. The patient is conscious of a sensation of distension of the skin where the swelling occurs and feels as if he were walking on soft pads. In the late stages, the tips of the toes become slightly benumbed, but with this exception no symptoms of affection of the peripheral nerves are noted. No sleeplessness or headache accompanied the swelling; and although slight lassitude

was noted, the brain is quite alert and the patient, in cases of average severity, goes through his usual work without much fatigue either of brain or body.

7. *Lungs.*—No symptoms referable to the respiratory tract were found. In cases in which the swelling extends up the whole body, cough and difficulty of breathing set in. In all the fatal cases there was difficulty of breathing. In some of these fever also occurred, but probably these were cases of pneumonia and the others were cases of œdema of the lungs.

DISTRIBUTION OF THE PATIENTS ACCORDING TO AGE, SEX, CASTE AND NATIONALITY.

Age.—No cases of the disease have occurred among infants. One child of 4 years had an attack and two children of 5 to 6 years were also attacked. Some of the cases were in boys and girls from 12 to 20 years belonging to the mission and the rest were in people of all ages up to 60 years.

Sex.—Both sexes were attacked. Of the cases recorded, 60 were males and 42 females. In the mission, the boys and girls were equally affected (Khond boys excepted).

Religion.—Three were Muhammadans, 38 were Hindus and the rest were Indian Christians. The preponderance of Christians was due to the fact that the mission was affected. Five Europeans were affected by the disease out of a total of six in the mission.

Effects of the disease.—In about 90 per. cent. of cases, the effects were slight, and patients carried on their work as usual. The Sub-Inspector, the Sub-Registrar, the Health Inspector, the clerks and the European priests all carried on their ordinary duties except when incapacitated by severe diarrhœa or dysentery. In mild cases, the swelling lasted from 15 days to a month. In more severe cases, the patient generally became bed-ridden, with profound anæmia, weakness of the heart and difficulty of breathing.

Duration of the disease.—A few cases having only slight swelling recovered within 15 days, but others who had severe dysentery and moderate swelling had symptoms for more than four months. The average duration of the disease may be said to be about three months. All severe and fatal cases occurred early, i.e., in the months of April or May. Later cases were generally mild and of short duration, showing only slight swelling of the legs and feet.

Mortality.—Out of about 102 cases, six died; and among 50 cases in the mission premises, four deaths were recorded.

PREVALENT THEORIES OF CAUSATION HELD BY THE VILLAGERS.

1. The people of Surada believe that the disease is infectious and owes its origin to the midwife who brought infection into the village. The subsequent history of the disease and the course of the present epidemic fully justify this belief.

2. Another idea gaining ground among the villagers is that the disease is due to some poison

in adulterated gingelly oil. They allege that gingelly seeds are mixed with seeds of an agency plant called in Oriya "Odisimari" and that the oil from the latter seeds is poisonous. In support of this theory, they state that the pure oil of these seeds when applied to the body produces erythema and local swelling, and that, if internally administered, it is certain to produce the disease. Enquiries made from those who extract the oil bear out this statement; unfortunately, it has not been possible to procure the pure oil and test it by external application. A sufficient quantity of the seeds has, however, been obtained for analysis.

3. Still another theory is that the disease is due to the fish caught in the reservoir. This idea need be given no consideration as the villagers almost without exception are fish eaters.

In order to test the second theory, laboratory animals might be given the seeds, or the expressed oil, in their food and their condition watched.

In no other part of the district is the oil of these seeds used as an adulterant of gingelly oil.

Gingelly oil is generally dear in remote places in the district such as Surada.

The seeds of this "Odisimari" plant are available in abundance all round Surada and in that part of the Ganjam agency. The oil is sometimes also used for lighting purposes.

The statements made by some of the *tellies* (whose occupation is extraction of oil) are quite definite that this oil produces oedema when locally applied.

"Food deficiency" theory.—I do not believe that food deficiency is the cause of the disease in the Surada epidemic. Being an important village and a centre of trade, fruits, vegetables and other food-stuffs are more easily procurable there than in other villages lying round. Those who come in close contact with village life know how difficult it is to get vegetables in the villages and fresh vegetables are almost unknown on six days of the week. Only on the weekly *shandy* day in some central village are vegetables, mutton or fish procurable and each family keeps a stock of vegetables sufficient to last for a week. Comparatively speaking, Surada is far better off in this respect than any other village in the neighbourhood. Vegetables and fish can be had every day, and mutton on three to four days of the week. In summer, scarcity of vegetables exists everywhere except in large towns, such as Berhampur, Parlakimedi and Chicacole. The people of Surada are all non-vegetarians and non-vegetarians are at an advantage, for the large Surada reservoir supplies plenty of fresh fish and even the poor can get daily supplies of fresh fish in the absence of vegetables. Very few other villages in the neighbourhood are so advantageously situated as regards fresh fish.

Rice.—The people of Ganjam generally use parboiled home-pounded rice, and the percentage using raw milled rice may be said to be negligible. Round Surada, the paddy crop is not so

abundant as in other parts of the district, and consequently rice has to be imported. As a general rule, storing of paddy is not practised except by the well-to-do, who store it for about 6 months before it is parboiled and pounded. A few of the well-to-do also store rice in a different way. They parboil the paddy, dehusk it, and store the dehusked rice leaving the pericarp intact. Rice is imported from Aska or Kudla Taluk, and the villagers never store the pounded rice more than a few days or at most a month, because want of labour prevents the pounding of the rice in large quantities. Before being cooked, the rice is generally washed twice or thrice, it is then boiled and the rice-water is always thrown away. A dietetic history of the inmates of the mission boarding-house has been obtained as far as the priest-in-charge and the boys could give information.

The paddy, stored in their own granary, is obtained from the fields in sufficient quantity to last for a year and 6 months, so that there is no necessity to use rice until it is six months old. In 1926, however, new rice had to be used as soon as it was obtained. The paddy is given out in small quantities sufficient for about a week. The coolies who pound it return the rice and take fresh supplies every week or so. The rice is not stored as such for any length of time. Only boiled rice is used and it is boiled with water from a dirty tank used by the whole village.

The boys have generally three meals a day and when the harvest of rice is poor, as was the case this year, they get *ragi* gruel in the morning instead of rice gruel. Except for this difference, there has been no change of diet between this year and previous years. On the other hand, the diet has distinctly improved this year owing to new management. The children get meat at least twice a week, and since the outbreak, three times. *Dhal*, gram and vegetables from their garden, in addition to fresh or fried fish are also given. This diet is much better and cleaner than that of the ordinary villager. No milk is given except in cases of illness, nor do the boys get buttermilk. The granary is constructed of timber, is raised above the ground, and has ventilation at the bottom. It is of better construction than the ordinary village granary, for paddy is usually buried under ground until the rains set in. This latter method is not possible in Surada because of the high level of the sub-soil water, but bamboo baskets thickly coated with cow-dung to prevent access of air and water are also sometimes used.

Enquiries as to the diet in the hotel show that it consists of vegetables, fish and rice. No ghee or curd is given except as an extra, and the rice used is bought in the bazaar. It is extremely difficult to get the actual diet for every individual case, so that it can only be noted in general that the people taken two meals a day, consisting mainly of rice, eaten with *dhal*, curry and a vegetable curry and some chutney. When fish is provided,

the vegetable curry is replaced by fish curry with which some vegetable is also mixed. . . Among the poor, the diet will generally be rice, *dhal* water and a fish curry. The morning meal will generally consist of rice-water kept overnight with some rice added. This is eaten with tamarind, salt and green pepper. Milk and buttermilk are never used by villagers of the lower classes.

From investigation of the epidemic at Surada, the disease cannot be said to be due either to deficiency of proteins or of the organic salts of fresh vegetables. This certainly cannot be the case among people of a better class. None of the European priests can be said to live on a poor diet. The Sub-Inspector of Police, the Sub-Registrar and Range Officer all live on a better diet than the average villager who has escaped infection. In three cases only was there a definite history of a stay of one week in Surada. A deficiency disease, it is felt, cannot develop in such a short time. For example the Sub-Registrar came to Surada on transfer from Berhampore on 20th May, had dysentery on 25th and 26th May, and noticed swelling of the legs on the 27th. The Health Inspector again came to Surada on 22nd July and about the 1st of August he had dysentery and noticed swelling of his feet and legs. Govinda Patnaik, the clerk of the Sub-Registrar's office was in the village only a few days before the swelling appeared.

Another argument against the deficiency theory is that in this epidemic two cases are known to have completely changed their diet within a few days of noticing the swelling but without effect. Both the Sub-Registrar and the Sub-Inspector of Police, as soon as they saw the swelling, changed their diet to wheat, milk, fish and vegetables, but in both cases, the disease ran its natural course of about three months.

Theory of infection.—In describing the course of the disease during the year, the cases which have shown some relation to one another have been linked together as far as possible. With Paiko Street as the centre of dissemination of infection, it has been shown how the "infection" was carried to the mission boarding-house which had been till then free and to the taluk office. Again from the hotel as another centre of infection, it has been possible to trace the "infection" to (1) Sub-Registrar's office, (2) Mahapatro's house, (3) Postmaster's quarters, (4) Forest Ranger's office, (5) School lodging house, (6) timber merchants, (7) Health Inspector, (8) hotel-keeper's daughter, (9) tailor. Another group of cases, apparently unconnected with each other or with any of the cases of the two main groups, have been separately classified.

On the whole, about 102 cases have come to notice and probably only a few have been left out. The Inspector of Surada during his periods at headquarters, has done his best to trace out cases and from enquiries made by myself, I do not think many cases have been omitted. Out of the total number, about 88 cases can be linked together, leaving some 14 cases of which there

are only a few (such as these among the Police staff and Komate's house) having some relationship. From the study of the individual attacks with reference to the time of onset of each case and having the plan of the village in mind, the conclusion seems definite that the disease is infectious, although the investigation of the disease was begun and carried through without any pre-conceived notions of this nature. All the subsequent findings have only confirmed this idea that the disease is an infectious one.

How the disease is spread.—Of the 88 inter-related cases, it is not possible to indicate one common mode of infection. If such does exist, it can only be air or water. The former is too general for discussion and the latter can be left out, considering the infection among the mission inmates, who have a pucca well for water-supply, and among the officers and police constables who also possess a separate drinking-water well. While only about 40 cases have occurred in the whole population of Surada who use the river as a common source of water-supply, about 65 cases have occurred among a little more than 100 persons using the protected water-supply. Further, of the former 40 cases, more than half are among the boarders of the hotel. It is more probable, therefore, that other modes of infection must have been at work.

1. It seems fairly clear that the most important mode of spread of the disease is through food. The cases among the boarders at the hotel and among the inmates of the mission are the best examples of this. [These groups of cases may also be taken to prove that the method of spread cannot be by human parasites, such as lice or ticks. Of about 80 boarders in the mission about 20 agency boarders have separate board and lodging. Of the remaining 60, boys and adults, not less than 55 have suffered from the disease. Similar enquiries have been made in the hotel. Sixteen boarders messed in the hotel more or less permanently, and of these all but three suffered from the disease. As far as possible, a list of persons, who are new arrivals in the village, has also been prepared. Of 33 such persons, excluding the families, 25 have suffered from the disease. Of these 25 persons, 16 have been messing in the hotel and the others were associated with people suffering from the disease or lived in Paiko Street. A few (3 or 4) apparently are of independent origin.]

2. All cases do not come under the same category of infection through food. The infection from Chourriappa to the mission inmates could not be through food nor could the infection of the Sub-Registrar from his clerk Somanath Patnaik. The infection of the members of the Mahapatro's family by P. V. Krishna Rao must also be by some other mode. The only other possibility seems to be by means of infected hands.

The attacks among the Forest Rangers, Postmaster, etc., can only be explained by saying that infected hands conveyed the disease.

In the valuable and suggestive notes sent by Col. MacCarrison, mention is made of the possibility of infection by the bed-bug. A clear inference on this point could be drawn from the two groups of cases investigated.

In the mission group, the patients lodge and board together; in the hotel group, they board together but lodge in different places. The percentage of infection among both groups is equally high. The fact that the infection has not been carried to places where the patients in the second group lodge is conclusive proof that infection was not spread by this means. Further, the European priests ascertained that there are no bugs or lice among the inmates and certainly not in the apartments occupied by the Europeans.

The nature of the infective organism is not easy to make out. It is probably present in the intestines or in the soil and becomes virulent in summer, but so far no other place in the district has been affected.

Immunity.—An attack does not give any immunity; on the other hand, the same persons are prone to infection in subsequent years. Some of the villagers have suffered from it annually, and in some cases during the year under report the patient, after showing some improvement in swelling and in the diarrhoea, has had relapses.

Treatment.—The only means of prevention will probably be found in isolation, and a change of residence during the summer months. In the absence of any definite knowledge on the subject, disinfection of excreta and clothing, etc., should be carried out. Good nourishing food with plenty of fresh vegetables and fruits will probably go a long way to maintain health.

Curative.—The treatment must be purely symptomatic. Keeping the bowels open in the absence of diarrhoea will probably lessen the swelling. The local medical officer has found great improvement in patients who were treated with tincture of digitalis and potassium iodide, 10 to 15 minims of the former with 5 grs. of the latter per dose. Major Carrick tried a few cases with adrenalin solution, 2 minims, with little or no success. In severe cases with oedema, rest and diuretics may help to lessen the swelling.

Plans for the future.—The disease is gradually and year by year assuming bigger dimensions. The importance of systematic study of this disease can no longer be ignored. The opportunity of studying an unknown disease confined to a small locality will be lost as years go on.

Col. MacCarrison's criticisms, comments and notes on the disease have been most welcome at the time I was preparing this report and I am much indebted to him for his valuable suggestions.

In conclusion, I must not fail to thank Domburi Torasia, Health Inspector, Surada, who enthusiastically assisted in collecting all available information and intelligently carried out my suggestions.

(There are distinct indications that the infection of these patients came about by means of food, but this does not necessarily mean that the food suffered contamination of human origin. The history of the origin of the rice is not clear, and it seems possible that the clients of the hotel and the other patients obtained diseased rice from a common source. One would not have expected the home-grown rice eaten in the mission to have been diseased, but is the writer quite certain that the mission *never* obtained rice from outside sources?—EDITOR, I.M.G.).

AN OUTBREAK OF EPIDEMIC DROPSY IN ALLAHABAD IN 1927 (FEBRUARY TO APRIL).

By G. GHOSH, M.B., B.S., D.T.M. (Bengal),

Lukergunj, Allahabad.

It was early in February 1927, that a few indigenous cases of epidemic dropsy came under my observation. I immediately tried to strike a note of warning to the public of Allahabad through all the local papers, exhorting people to stop eating rice—particularly the parboiled milled rice.

The number of cases began to increase rapidly till it reached its maximum in April 1927. Then the incidence fell gradually till the end of May, when there were no fresh seizures from the disease.

In my investigations during the epidemic a few facts were brought out which may be of some importance in throwing light on the etiology and prevention of the disease. They may be summarised as follows:—

(1) The disease showed a predilection for the Bengalees, though I came across a few cases of the disease amongst Anglo-Indians. On enquiry I found that these Anglo-Indians were partial to rice. A few Kashmiris were also affected, but they, like the Bengalees, were also rice eaters. Amongst the up-country people, only one single case of this disease came under my observation. He was a servant in the employment of Mr. S. C. D. of George Town (*see* under family No. 15 of the table), who obviously developed the disease after partaking of the infected rice of his master.

(2) Some Bengali families took a timely note of my warning and stopped taking rice from the very beginning of the epidemic (February 1927). A few others, finding it hard to stop rice altogether, took to local coarse (hand-milled, red) rice. Although they were staying in the worst part of the epidemic areas, none of them developed any symptom of the disease.

(3) Allahabad has several *mundis* or wholesale grain markets. All the smaller merchants and the public who buy large quantities of grain at one time, generally make purchases from these *mundis*. One of the *mundis* is known as *Khalifa-mundi* and it was a striking feature of

the last epidemic that the prevalence of the disease was almost limited to localities which were situated round about this *mundi*. That is to say, the affected area corresponded fairly well with the area of supply of rations by this *mundi*.

It is interesting to note in this connection that a rice merchant, Babu N. C. C. of Gushkara (District Burdwan), came to Allahabad for a change in December 1926. He supplied from Gushkara—a well known rice centre of Bengal—7 wagon loads of machine-milled par-boiled rice (variety *dudhkalua*) to three wholesale merchants of *Khalifa-mundi* early in January 1927. Each wagon-load contained about three thousand rupees worth of rice.

(4) There was one remarkable fact about the epidemic. All the babies and small children escaped the disease entirely. In my series of cases, the ages of the persons affected with the disease ranged from 8 years to 65 years.

The principal symptoms of this disease in the last epidemic were as follows:—

(a) Gastro-intestinal symptoms: diarrhoea, loss of appetite, dysentery. These were generally the first symptoms complained of by the patient.

(b) Dropsy: œdema of the legs and feet were present in almost all the cases. In a few cases there were effusions in the pleural and peritoneal cavities.

(c) Cardiac disturbance was a marked feature in this epidemic. Dyspnoea, palpitation, insomnia, tachycardia and signs of dilatation of the heart were present according to the severity of the disease. All the cases that died of this disease had terrible cardiac dyspnoea and died of heart-failure.

(d) Nervous symptoms: most of the patients complained of tenderness of the calf muscles. The knee-jerks were increased in a few cases, but in the majority of cases they remained unaltered.

(e) In most of the cases fever was present. It ranged generally from 99° to 101°F.

(f) Hæmorrhage. In some cases this was present in some of the following forms:—

- (1) Bleeding from gums.
- (2) Bleeding from intestines (dysenteric symptoms).
- (3) Epistaxis.
- (4) Bleeding piles.
- (5) In one case a hæmorrhage from the uterus which terminated in abortion.

(g) Eye troubles—

- (1) Glaucoma—in one case.
- (2) Diminution of vision—one case.

Further details of these cases will be found in the table.

Some of the Cases of Epidemic Dropsy Observed in Allahabad during February to April 1927.

Serial number.	Family of—	Locality.	Total number of persons in the family.	Number of members affected by the disease.	Special symptoms or any intercurrent condition occurring in the course of the disease.	SPECIAL REMARKS.
1	A. K. M.	Grand Trunk Road, Lukerganj.	8 including a baby, 1 year old.	All the members except the baby.	(a) Patient got an attack of chyluria during the course of the disease (about a month after the onset of the attack of epidemic dropsy). His blood on examination showed microfilariae in large numbers. The chyluria is still persisting and the patient is very weak. (b) Mrs. M., had very severe and distressing cardiac dyspnoea. She has now recovered completely.	
2	H. C. S.	Bhawapur, Lukerganj.	23 including a baby, 5 months old.	All members affected (22), except the baby.	(a) Mr. S. (an old man), got piles which bled profusely. (b) Mr. S.'s daughter, aged 22 years, had very severe cardiac dyspnoea (died).	

Some of the Cases of Epidemic Dropsy Observed in Allahabad during February to April 1927.—(Contd.)

Serial number.	Family of—	Locality.	Total number of persons in the family.	Number of members affected by the disease.	Special symptoms or any intercurrent condition occurring in the course of the disease.	SPECIAL REMARKS.
3	G. S. D.	Lukerganj	8	4	Mrs. G. D., showed rather severe cardiac symptoms which were relieved by rest and treatment. About a month and a half after this she got B. T. malaria (fever 104). On exhibiting quinine 21 grs. a day, her old cardiac symptoms and swelling of the feet returned.	Since that time the patient has been getting fever off and on. If she takes quinine her cardiac troubles return and her ankles swell.
4	G. D. D.	Lukerganj	5	3	Mrs. D., marked cardiac symptoms. Profuse bleeding from the nose for several days.	
5	R. M. B.	Bhawapur, Lukerganj.	4	3	R. B. An alcoholic subject, cardiac symptoms marked. Fainted and collapsed once.	
6	S. D. G.	Khurdabad	5	5	His eldest son who had been suffering from kala-azar at Calcutta came here for treatment. His fever broke and his spleen disappeared under ureca-stibamine injections, when all of a sudden he developed symptoms of epidemic dropsy. The injections had to be stopped owing to cardiac symptoms.	When the injections were stopped he got a relapse of kala-azar with high fever and epistaxis and enlargement of the spleen.
7	S. C. M.	Grand Trunk Road, Lukerganj.	2	2	Mrs. M., also developed very distressing palpitations and tachycardia (pulse, 130 to 140).	
8	B. K. M.	Lukerganj	5	4	His daughter-in-law had very severe cardiac dyspnoea. For some time under rest and treatment, she progressed towards recovery but all of a sudden she became very ill and died.	
9	M. K. R.	Lukerganj	5	4	Mrs. R., developed high fever, oedema and inter-costal neuralgia.	
10	A. K. B.	Lukerganj	?	2		
11	A. C.	Lukerganj	5	3	(a) The patient developed glaucoma and was operated on for it. (b) His brother's eyes were also affected.	
12	S. N. B.	Lukerganj	3	3	His younger son, a boy of 8 years had severe cardiac dyspnoea (died).	
13	C. L. C.	Badshahimandi.	4 (including a baby, 1 year old).	3 (the baby was not affected).	....
14	S. N. G.	Lower Road	7	5	Mrs. S. N. G., developed cardiac dyspnoea and oedema of the legs and feet; very bad (died).	

Some of the Cases of Epidemic Dropsy Observed in Allahabad during February to April 1927.—(Concl'd.)

Serial number.	Family of—	Locality.	Total number of persons in the family.	Number of members affected by the disease.	Special symptoms or any intercurrent condition occurring in the course of the disease.	SPECIAL REMARKS.
15	S. C. D.	George Town.	4 + one servant.	2 + the servant	Patient suffered badly from insomnia.	When two persons in the family were affected, they stopped the use of rice. But instead of throwing away their stock of rice, they gave it to their servant. The servant developed the symptoms of epidemic dropsy about 20 days after he started taking the rice.
16	'D. Mess' Members exclusively Bengalees.	Shahganj	9	9	(a) 8 had all the usual symptoms. * (b) 1 had chronic diarrhœa.	
17	S. N. M.	Bairana	5	3	(a) Patient had fever, dysenteric stools, and swelling of the legs and feet. (b) His mother developed severe cardiac dyspnœa.	
18	S. B.	Katra	1	1	.....	On enquiry I found that they were partial to rice.
19	Mr. C. (Anglo-Indian).	Civil Lines (New range).	3	3	.....
20	Mrs. Stone (Anglo-Indian).	Civil Lines	1	1	.....

*In order to avoid repetition of symptoms in every case, only the special and most distressing symptoms have been noted against each case. The 'usual symptoms' in nearly all cases of this epidemic were—diarrhœa, swelling of the feet and legs. Pain in the calf muscles. Knee-jerks—in some cases slightly exaggerated and in others unaltered. Slight fever (100° to 101°F.), dyspnœa and anæmia. In a few cases the urine was examined. No albumin was found.

THE ETIOLOGY OF GREEN DIARRHŒA OF INFANTS: THE DEFICIENCY FACTOR.

By R. K. PAUL, M.Sc., M.B. (Cal.),
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GREEN DIARRHŒA is one of those fell diseases which are responsible for a great percentage of infant mortality every year. The disease is especially prevalent in summer and, when once it sets in, it becomes very obstinate and difficult to treat, so much so that patients go beyond the power of medicine and consequently infants die by hundreds.

The etiological factor mainly responsible for the disease is surely improper feeding of the infants, and it has been lately proved definitely that in 70 per cent. of the cases it is due to excess of fat and carbohydrate in the diet, and in 25 per cent. of cases may be due to excess of proteins in the food. Not only this—irregularity

in the time and duration of the feeds and sometimes uncleanly habits of the mother, also act as contributory factors. But in my opinion, based on some recent investigations on young rabbits, there is another paramount factor in the etiology of the disease: this is deficiency of the growth-producing and antirachitic vitamins A and D.

One of the female rabbits—with which I was carrying on some research work on vitamins—died six days after giving birth to two young ones. So I was compelled to put these two young rabbits on artificial feeding with a patent food for want of mother's milk. Before the death of the mother they were steadily gaining in weight, but for three or four days after the artificial feeding was resorted to, I noticed no improvement in the growth of the two. However, this was thought to be due to sudden change in their food. But on the 12th day, i.e., the sixth day of artificial feeding, one passed stools exactly like those of infantile green diarrhœa. All feeding except

water was stopped to this rabbit, but two days later to my surprise the other one also went down with a similar kind of diarrhoea. Growth stopped in both and every day there was loss of weight. Both developed rickety features, the hair lost its soft velvety feel, the head became large and box-shaped, and the "pot belly" was remarkable. The first died on the 15th and the second on the 16th day after birth.

Next time when another rabbit gave birth to four young ones, I selected one for the same artificial food as given to the first set: one was put alternately on artificial feeding and mother's breast; and the other two remained breast-fed throughout. The first one of this series also developed diarrhoea, the third and fourth grew quite normally, while the second one, though it did not develop diarrhoea, was still below par.

These experiments with these two series of young rabbits convinced me of the importance of the deficiency factor in the etiology of the disease. This was also corroborated by some of the characteristic symptoms developed in the course of the disease, so typical of rickets which is undoubtedly a deficiency disease.

Ninety per cent. of the human infants also that develop the disease are found to have been taken from the mother's breast, the mother having very little milk in her breast, or in some cases being afraid of losing her own health by suckling the baby. The natural food of a baby is mother's milk which supplies all an infant wants for its proper nutrition and particularly the vitamins A and D, which promote growth and prevent the development of rickets. So, when mothers go against Nature by refusing to suckle the child, they are sure to pay the penalty, as a consequence of which the child develops diarrhoea which very often proves fatal. Even in cases where lactation is not sufficient for the baby, the baby ought not to be taken from the breast, because once the child is taken from the breast, the lactation, whatever there is of it, is sure to fail. Nowadays there are no two opinions about the fact that a hungry suckling child is the best lactagogue ever known.

It may be pointed out that there are many cases in which even breast-fed infants develop the same disease, but even in these cases the deficiency factor comes in. In most cases of green diarrhoea in breast-fed infants, it is found that the mother feeds her baby on no regular system. Whenever the child is crying she thinks it to be hungry and at once puts the nipple of her breast to its mouth, so that it goes on suckling for half an hour to an hour, or every 15 to 20 minutes repeatedly. The whole quantity of milk that the baby takes, does not contain all the essentials proper for its nutrition. Only the very first portion for five to seven minutes contains those; the rest of the milk that comes after this is deficient in vitamins and especially rich in fat and slightly so in carbohydrate (lactose) as well. So under these circumstances there is no wonder that the infant develops the disease, though breast-fed all the while.

Sometimes negligence of the mother in cleansing her nipples and the child's mouth after feeding also supplies a minor contributing factor to the causation of the disease.

Want of proper rest on the part of the mother, improper dieting and constipation of the mother also add to these factors, because all these lead to disturbance in lactation, causing disturbance in the child's nutrition. The mother should also avoid as far as possible taking excess of milk, sago, or those articles that have the reputation of so-called lactagogues amongst the common folk, and during the period of lactation should never take anything that may give her constipation or flatulence.

Sometimes babies have got to be fed artificially, the mother having died or having no milk at all in her breast. In such a case, slight indiscretion in dieting will surely cause diarrhoea. The best natural food for a child after mother's milk is cow's milk—humanized by dilution and addition of sugar and cream. Never should food be given in excess at a time. The excess of fat and carbohydrate or protein, will also lead to the development of diarrhoea. The best way to avoid this is to weigh the child after each feed. If it has taken too much, the number of feeds must be reduced. If it has taken too little, it may lead to malnutrition of the child. So some whey water or skimmed milk ought to be given in addition. The feeding of the child should be according to a definite rule in proportion to the age; the simplest one is to give the child up to six months each time one ounce more than the number of months the child is old.

The main point of this note is to lay stress on the deficiency factor in the etiology of the disease, and the writer can confidently assert that the disease can also be grouped in the same class as the other deficiency diseases of infancy, such as rickets, spasmophilia, scurvy, marasmus and infantile cirrhosis of the liver.

LATE MANIFESTATIONS OF SYPHILIS WITHOUT A HISTORY OF PRIMARY SORE.

By A. C. BHARADWAJ, L.M.P.,
Thomason Hospital, Agra, U. P.

It is a mistake to regard the primary sore as a certain precursor of the later stages of syphilis. Many failures of treatment—some of them amounting to blunders—can be avoided if it is remembered that, apart from the tendency on the part of the patient to deny the history of a venereal sore, many primary chancres are extra-genital, and trivial lesions on the genitalia, which are in reality due to syphilis, are frequently overlooked. Not infrequently such trivial sores on the genitalia are treated as simple abrasions, without any suspicion on the part of either physician or patient that they are really of syphilitic origin. Intra-urethral chancres are usually mistaken for gonorrhoea, and treated as such; the

primary lesion then heals up, and when secondary or tertiary lesions develop, and the patient is questioned by his physician, he innocently denies all history of a primary sore.

It is likewise futile to place explicit reliance on the presence of a scar on the genitalia, for often the scar left is imperceptible, and the lesion may even not be noticed by the patient himself. In women, the primary chancre is usually situated in the vagina; there is no discomfort at all, and the patient may be entirely unaware that she has become infected. Further, the patient often tries to mislead the doctor with reference to the previous existence of a chancre, and Indian women in particular are extremely reluctant to confess to previous possibilities of infection. Perhaps the majority of patients will admit to the possibility of infection, but there is a certain minority who will not. Consequently, it is the duty of the medical practitioner, whenever certain signs of secondary or tertiary syphilis are present, to give antisyphilitic treatment, whether the patient confesses to the possibility of infection or not.

Osler remarks that "irregular sexual intercourse has existed from the beginning of recorded history, and unless man's nature wholly changes—and of this we have no hope—will continue. And therefore syphilis is common in the community, and is no respecter of age, sex, or station in life There is seldom any doubt concerning the recognition of syphilitic lesions, but the number of persons without any evident sign of the disease in whom a positive Wassermann reaction is found, proves that a negative diagnosis cannot be based on the absence of history and clinical manifestations."

A case of this type is quoted in the *Tropical Diseases' Bulletin* for January 1926, on p. 41. Some gummatous lesions appeared on the face of a boy aged 18, without any previous history of syphilitic infection. The reviewer suggests that this might either be a case of congenital syphilis, or of an overlooked extragenital sore. In my opinion either of the two suggestions is possible, but the possibility that the case might have been one of an acquired and overlooked primary chancre, must be taken into account. Hereditary syphilis usually shows its marked stigmata.

The following cases may be cited, as examples of how concealed or overlooked syphilitic infection may lead to the presentation of symptoms which are very puzzling, unless the possibility of syphilitic infection is borne in mind.

Case 1.—This occurred in the practice of the late Dr. C. M. Dey, a well-known eye specialist of Agra. A female child, aged 10, was brought to him by her father with a history of dimness of vision and haziness of the cornea of two years' duration. The father stated that he had consulted specialists in Bombay, Calcutta, and Madras, and despite much treatment and many remedies prescribed, the child had obtained no relief. Dr. Dey asked his students for a diagnosis, but none of them had any suggestion to offer. Dr. Dey then pointed out the characteristic forehead of the patient and the linear marks about the angles of her mouth, and the

diagnosis became clear—syphilitic keratitis of congenital origin. Two months' antisyphilitic treatment cured the condition.

Case 2.—T. R., a female patient, aged 40, had been suffering from chapped hands and feet for several years. The trouble used to clear up during the winter months and reappear in the hot weather. When I first saw her, the palms and soles were cracked with many deep and ugly fissures. The patient was so tortured with the pain from these that she frequently had to dip her hands and feet into cold water during the night. She gave no interesting previous history, except that her hair had shown a tendency to fall out. Several doctors had treated her, including one who had prescribed sarsaparilla, even in this present century of knowledge. The Wassermann reaction was tested in Calcutta and was found to be strongly positive, and the condition cleared up on a course of neosalvarsan injections.

Case 3.—Mrs. P. A., a married woman, 35 years of age, and the mother of four healthy children, had been subject to epileptic fits for two years. When I first saw her, she had had the fits every two or three hours during the previous five days. She was lying unconscious, and restoratives had to be employed to bring her round. On detailed enquiry she stated that she had had severe pain in the shins, and that this condition had preceded the fits. On examination I found marked thickening of the periosteum of both tibiae. The husband denied all history of syphilis, but his friends volunteered the information that he was keeping a prostitute. A course of seven injections of neosalvarsan effected a radical cure. The fits disappeared, the menses—which had been irregular and scanty—became normal, and the thickening of the shin bones disappeared. Two-and-a-half years later the patient was in sound health. The neosalvarsan injections were supplemented by a mixture containing potassium iodide and mercury by the mouth.

Case 4.—S. B., a married woman, 30 years of age, and a mother of two healthy children, consulted me for severe menorrhagia and pain in the back of two months' duration. In the left iliac region there was palpable a hard, horny growth, about the size of a mango. It was very irregular in shape and very tender on palpation. The pain was so severe that the patient had great difficulty in getting out of bed. I examined her in consultation with a lady doctor, who considered that the case was one of abscess in the pelvis, and advised immediate operation. My own tentative diagnosis was fibroid of the uterus, since the patient had no fever, had had severe bleeding from the vagina, and was extremely anæmic. I called in the then Civil Surgeon of Benares, who agreed with the diagnosis of fibroid of the uterus. He advised hysterectomy, but to this the patient would not consent. I gave a mixture of potassium iodide and mercury orally, and iodine douches to the vaginal canal. To my surprise the patient immediately started to improve rapidly. I now had the Wassermann reaction carried out and it was found to be strongly positive.

I then advised injections of neosalvarsan, but the patient refused all injection treatment, and continued with the mixture orally. To-day she is in good health and the tumour has disappeared. I have lately had her examined in consultation by the Civil Surgeon of Benares, and he is of opinion that the tumour might have been a gumma somewhere in the pelvis, together with syphilitic endometritis.

Case 5.—This was a middle aged man, about 38 years of age, suffering from chapped hands and feet for several years. He was a clerk and much worried both about the appearance of his hands and the effect on his writing. There was a history of slight paresis of the right side of the body some months previously, but he denied all history of syphilis. He admitted, however, that he had suffered some years previously from gonorrhoea, which had subsided within a few weeks without treatment. He was quite frank when cross-examined, and did not suspect that he could have had syphilis. Yet one fact set me on the right track: his two sons, aged 10 and 6 years respectively, had extragenital sores on the lips. His condition rapidly cleared up on

antisyphilitic treatment. In this case the primary sore was probably situated in the urethra.

Case 6.—This was a similar case, who came under treatment for leucodermic patches bilaterally situated on the legs and scrotum. Again, he admitted a history of gonorrhoea, but denied all history of syphilis. The lesions disappeared entirely under antisyphilitic treatment.

Case 7.—An unmarried girl, 10 years of age. No history of primary sore and no signs of congenital syphilis were present, yet she had a typical syphilitic macular rash all over her body. The Wassermann reaction gave a strongly positive result. I did not disclose the diagnosis to her parents, but gave a full course of neosalvarsan injections, and mercury orally. The condition cleared up completely.

Case 8.—This was a young married woman suffering from optic neuritis. There was no definite history of syphilis in either the husband or the wife, yet the case completely cleared up on antisyphilitic treatment.

My object in writing this note is to show the importance of not depending on the history, or of examination of the genitalia for a scar, when lesions typical of secondary or tertiary syphilis are present. The symptomatology of syphilis is so protean in character, that it is always advisable to have a Wassermann test carried out in all cases of doubt. Negative history with reference to a primary sore should never be allowed to rule out a possible diagnosis of syphilis.

A PRELIMINARY NOTE ON THE DECOLOURISATION OF A SOLUTION OF METHYLENE BLUE WHEN LEFT IN CONTACT WITH KALA-AZAR SERUM.

By T. C. BOYD,
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and
A. C. ROY, M.Sc.

RECENTLY while experimenting with solutions of various dye stuffs on kala-azar serum, we observed that when solutions of methylene blue were left in contact with kala-azar serum, the dye gradually decolourised. We have tried out various strengths of methylene blue solutions varying from 1 in 2,000 to 1 in 80,000 and obtained the most satisfactory results when working with a solution of 1 in 40,000.

The procedure adopted was to take 0.5 cc. of a known kala-azar serum and then add an equal quantity of a 1 in 40,000 solution of methylene blue. Controls were put up using normal serum. The tubes containing the mixtures were then corked and paraffined and left at bench temperature (about 85°F.). Usually about the third or fourth day decolourisation commenced in the tubes containing the kala-azar serum and gradually became more pronounced, no change being observed in the tubes containing the normal serum. The addition of a layer of toluene altogether inhibited the reaction. We also observed the fact that variations of temperature affected the result. These points, coupled with the presence of a Gram-negative motile bacillus, led us to the conclusion that the decolourisation effect was due to the presence of a

micro-organism growing in the medium and we think it worth recording the difference noted between the normal serum and kala-azar serum, especially as we know that the latter serum is rich in globulin. We hope at a later date to be able to investigate this peculiarity more fully.

ECONOMIC SIGNIFICANCE OF MALARIA TO AN INDUSTRIAL CONCERN: A RAILWAY.

By G. R. RAO, D.T.M. (Cal.).

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Introduction.—To the clinician and to the purely laboratory worker, the question of "Economics," is apparently of no significance. But, to the prospective malaria expert, it is the most important question to be answered. For, he has first to convince the shrewd industrialists, the proprietors of large industrial concerns, who refuse to think of anything but rupees, annas and pies that it pays to eradicate malaria and has thus to justify his position. To do this successfully he has to estimate first, the precise economic loss caused by malaria, to the industrial concern which appoints him. Herein lies the importance of the "Economic survey of the disease."

That such a survey is an essential preliminary to any preventive scheme has been stressed by Sir Ronald Ross, who, in his book "The Prevention of Malaria"—1911, p. 252, writes:

"What precisely is the economical loss to the community caused by malaria? From the preventive point of view, that is perhaps the most important question before us, because, obviously it governs the question of the expenditure, which may be demanded for the 'Anti-malarial campaign.'"

No apology is, therefore, needed for submitting this short note.

Area of Survey.—The Lalmanirhat district of the E. B. Railway has an unenviable reputation of being the most "feverish district." When the writer was first appointed in October, 1926, as the Malaria Medical Officer to conduct preliminary survey, the opportunity was taken to collect as far as possible accurate figures—representing the incidence of malaria—amongst the staff throughout the district. Before touching upon the methods employed to secure these figures, it may not be out of place to describe briefly the nature of the area surveyed.

The "District" comprises parts of the civil districts of Bogra and Rangpur from Bengal and parts of the civil districts of Goalpara and Kamrup from Assam, besides the state of Cooch Behar, the Duars, and the terais of the Jaintia and Bhutan Hills. Two important rivers course the district, the Brahmaputra and the Teesta, besides numerous small rivers and jungle streams. The physical features of the district present several variations from absolutely flat plains to the slopes of the terais and the marshes of the jungle, with varying incidence of malaria.

Oct., 1928.]

For descriptive purposes the whole district is divided according to the physical features into several sections and a brief description of the chief physical features of each section together with its malarial incidence, is given below:—

Section (1).—From Gabtali to Fulchhari is fairly flat, slightly under 1,000 ft. above sea-level and presents a varying incidence of malaria—Bonarpara Junction showing the highest, 18 per cent. "fever index."

Section (2).—From Bonarpara (exclusive) to Kaunia—is also practically flat, with thick jungles here and there. Only one station, Bamandanga, shows rather a high incidence, about 50 per cent. fever index.

Section (3).—From Kaunia to Parbatipur Junction (exclusive) is slightly on a higher level than the preceding sections and shows a slightly lower incidence.

Section (4).—From Teesta to Kurigram and Teesta to Lalmanirhat is also practically flat and is comparatively free from malaria.

Station Lalmanirhat being a headquarters station of the metre gauge and having a big railway colony with a population of about 1,355 employees and their dependents, who come from various parts of Bengal with different degrees of malarial incidence shows malaria practically throughout the year with seasonal exacerbations.

Section (5).—Gitaldaha to Cooch Behar lies within the state of Cooch Behar and shows different degrees of malarial incidence in different stations with seasonal exacerbations.

Section (6).—Cooch Behar (exclusive) to Raja Bhatkhawa comes within Alipur Duars. From Raja Bhatkhawa to Jainti comes within the terais of the Jaintia Hills and Raja Bhatkhawa to Dalsingpara comes within the terais of the Bhutan Hills. This section is the worst from the malariologist's point of view. The station Raja Bhatkhawa deserves special notice as malignant tertian malaria is present there throughout the year and a fulminant epidemic is the rule. The staff consider it a punishment to be posted to Raja Bhatkhawa. Also this is the section in which one could not but come across several cases of blackwater fever. The incidence of malaria in this section is practically 90 per cent. Any one coming to serve in this area is sure to wire for sick leave within a month of his arrival.

Section (7).—Gitaldaha (exclusive) to Golakganj is also flat with patches of jungle here and there with a patchy malarial distribution.

Section (8).—Golakganj to Dhubri is flat and sloping towards the Brahmaputra and belongs to the Gauripur State. Malarial incidence here is comparatively low.

Section (9).—Golakganj (exclusive) to Sorbhog is a gradual ascent and the line traverses thick forests, mostly "Sāl" forests and woody jungles common to the tropics. This section shows a fairly high malarial incidence throughout the year with seasonal exacerbations.

Section (10).—Sorbhog to Rangiya and Tangla. Here the line passes through an area full of the bushy weeds of Assam fed by numerous jungle streams, and malaria exists practically throughout the year.

Section (11).—Rangiya (exclusive) to Amingaon slopes towards the Brahmaputra and is rather hilly. This area shows comparatively very little malaria.

Amingaon (Station) by virtue of its being the terminal station contains a fairly large staff (about 480). Except the large borrowpits in the vicinity of the station, there is practically no depression of land and no possible breeding grounds. The land slopes towards the river and so there is a natural drainage of the subsoil water into the river. This station can be said to be almost free from indigenous malaria. But the large staff coming from different districts of varying malarial incidence with varying degrees of infectivity and immunity is responsible for a slight amount of malaria.

Now it is clear that one has to deal with tracts of different physical features with varying malarial incidence.

COLLECTION OF FIGURES.

For administrative convenience the district is divided into several units—Lalmanirhat, Kaunia, Cooch Behar, Fulchhari, Raja Bhatkhawa, Sorbhog, Rangiya and Amingaon. Each unit is under the medical charge of a travelling sub-assistant surgeon, who is responsible for the collection of malarial statistics and for the treatment of cases in his unit.

Lalmanirhat and Amingaon each have a hospital in addition, with a medical officer (assistant surgeon) in charge, to deal with the station staff. These medical officers are responsible for the collection of statistics for these stations only and for treatment.

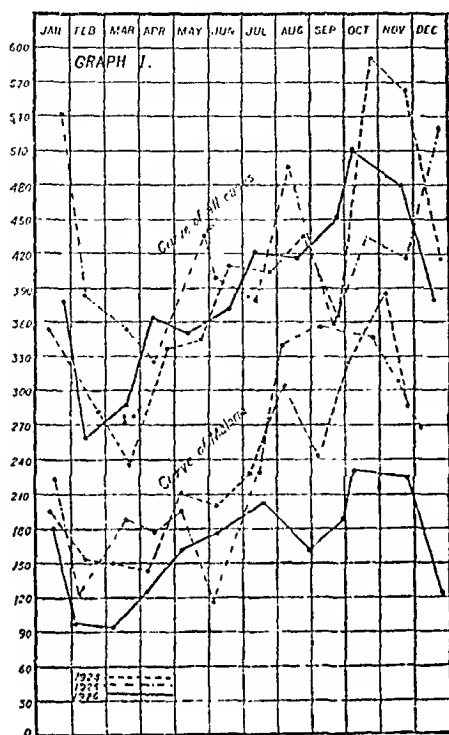
The number of cases of malaria treated by the travelling sub-assistant surgeons and medical officers in their respective units, together with the number of days of certified sickness and other particulars, were submitted to the Special Malaria Medical Officer of the district, every month, on special forms. These figures form the basis of this present paper.

For comparing the malarial incidence from year to year, in addition to the figures for 1926, those for two previous years 1924 and 1925 were also collected.

The figures representing the incidence of malaria throughout the district, month by month, for the 3 years 1924, 1925, 1926 are given below in Table I. To give an idea of the proportion of malaria to all other sickness, the total number of cases of sickness from all other causes for the whole district, month by month, is also given side by side. Graph I shows the same, viz., proportion of malaria to sickness from all other causes for the district, month by month, for the

three years 1924, 1925 and 1926, more vividly than Table I.

GRAPH I.



Graph showing the relation between the number of cases of malaria and the number of cases of sickness from all other causes.

TABLE I.

Months.	1924		1925		1926	
	All cases.	Malaria.	All cases.	Malaria.	All cases.	Malaria.
January ..	355	195	542	223	381	180
February ..	284	154	385	125	261	97
March ..	236	151	354	187	289	94
April ..	338	144	326	178	364	126
May ..	344	210	437	195	351	162
June ..	410	201	400	118	372	176
July ..	403	230	380	229	422	203
August ..	437	305	497	340	418	160
September ..	364	243	359	356	451	187
October ..	591	327	435	347	512	231
November ..	563	386	417	307	480	224
December ..	415	287	532	268	380	122

From a study of Graph I it is evident that the proportion of malaria to all other sickness is the same in the years 1924 and 1926. The curves for malaria and for all other sickness, in both the years, run almost parallel. But the year 1925 is rather peculiar. Both the curves in the year 1925 begin rather high and it seems that the year 1925 began with bad luck to the railway. The curve of malaria follows more or less closely the curve of all other sickness up to July. From

July the curve of malaria begins to rise comparatively higher and follows the rise of the all-other-sickness curve up to August and in September, while the latter comes down considerably the malarial curve does not come down. On the other hand it rises still higher than in August. From August to November, the curve is more or less maintained and the proportion of malaria to all other sickness during this period is obviously higher in comparison with the same period in the other two years, which means that there was comparatively more malaria in the year 1925 during the period August—November than in the years 1924 and 1926.

This holds good not only for the district of Lalmanirhat, but also for the whole line excluding, perhaps, Calcutta, as will be seen from the report of the then Chief Medical Officer Dr. Sladen, who, in his "Report on Methods of Malaria Control, on the E. B. Railway" page 2 observes: "The year 1925 was a bad one * * * There were 120,000 cases of sickness compared with * * * 112,258 in 1924. The year 1926 has been marked by considerable efforts to lessen the scourge of malaria in this railway, which has been the largest single factor in causing sickness and unfitness for service."

Both from the railway administrators' as well as the economist's point of view, the number of days lost on account of sickness is of greater importance than the actual number of cases of ill-health. Therefore, the number of days of certified sickness from malaria alone, is given below in Table II. For the sake of comparison the number of days of certified sickness from all other causes is also given side by side. A comparative study of both these figures in Table II will reveal the proportion of certified sick days due to malaria to the certified sick days due to all other diseases, but the same information can be more easily obtained by a reference to Graph II.

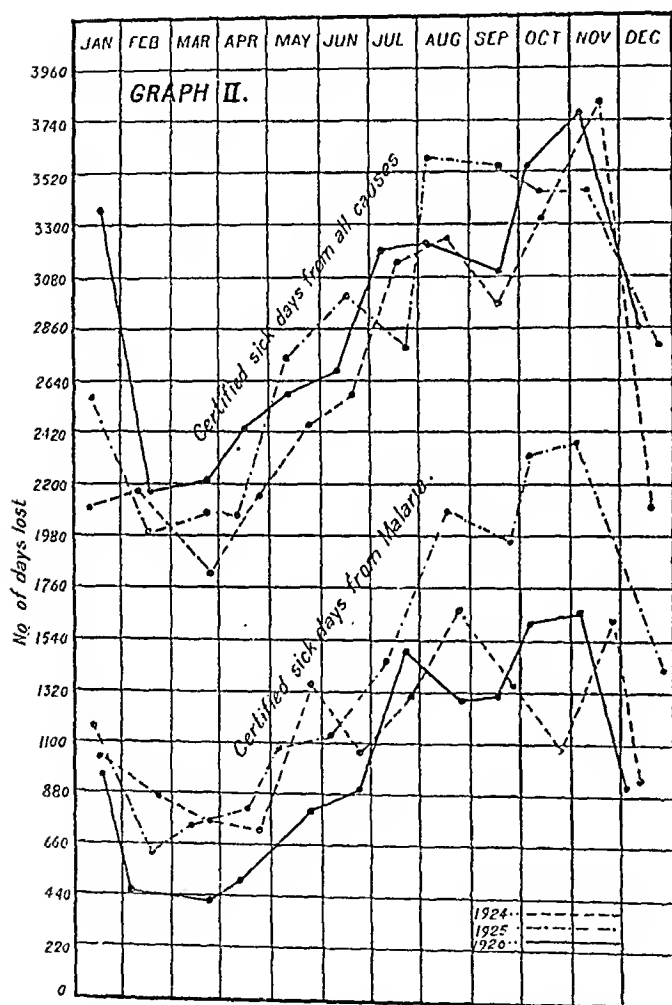
TABLE II.

Months.	1924		1925		1926	
	All cases.	Malaria.	All cases.	Malaria.	All cases.	Malaria.
January ..	2111	1041	2571	1169	3359	953
February ..	2181	876	1991	634	2159	459
March ..	1817	745	2085	746	2218	423
April ..	2164	726	2074	824	2457	517
May ..	2456	1344	2738	1086	2586	813
June ..	2561	1077	3009	1120	2681	899
July ..	3130	1311	2803	1456	3181	1523
August ..	3225	1679	3592	2071	3223	1284
September ..	2950	1335	3549	1976	3092	1317
October ..	3315	1092	3478	2319	3526	1624
November ..	3809	1623	3447	2390	3763	1676
December ..	2110	940	2821	1411	2867	919

A cursory glance through Graph II will show that the curves of certified sick days, i.e., days

lost to the railway, due to malaria and to all other causes, follow closely in the years 1924 and 1926 as was the case in Graph I, which means that the proportion of malarial cases to all other sickness and the proportion of number of days lost due to malaria to that from all other sickness was identical in both the years 1924 and 1926. But 1925 presents a different picture. Not only was there a relatively higher incidence of malaria, but there was a disproportionate increase in the number of days lost to the railway administration and the economic significance of this cannot be over-estimated.

GRAPH II.



Graph showing the proportion of certified sick days due to malaria to certified sick days from all other diseases for the three years 1924, 1925 and 1926 (monthly).

N.B.—The proportion of sick days from malaria to sick days from all other diseases was relatively higher in the year 1925 during the period August–November than in the other two years.

The correlation between the number of cases of malaria that occurred and the number of days lost to the administration by malaria alone in the 3 years 1924, 1925 and 1926 can be learnt from a study of Table III, which shows both the figures, month by month.

TABLE III.

Months.	1924		1925		1926	
	Cases of malaria.	Number of days lost.	Cases of malaria.	Number of days lost.	Cases of malaria.	Number of days lost.
January ..	195	1091	223	1169	180	953
February ..	154	876	125	634	97	459
March ..	151	745	187	746	94	423
April ..	144	726	178	824	126	517
May ..	210	1344	195	1086	162	813
June ..	201	1077	118	1120	179	899
July ..	230	1311	229	1456	203	1523
August ..	305	1679	340	2071	160	1289
September ..	243	1335	356	1976	187	1317
October ..	327	1092	347	2319	231	1624
November ..	386	1623	307	2390	224	1676
December ..	287	940	268	144	122	919

The same is represented graphically in Graph III which shows the relationship more clearly. A reference to the graph will show that a fairly constant relationship has been maintained between the number of cases of malaria and the number of days lost to the administration in the years 1924 and 1926. But in the year 1925, as is to be expected, this relationship is disturbed. A considerably greater number of days have been lost—due to malaria—in this year in comparison with the other two years, particularly during the period August–November, as is evidenced by the extreme height of the curve of “days lost” during these months.

When this is evaluated in terms of rupees, annas and pies what a tremendous loss it represents will be manifest.

To appreciate the amount of loss caused to the railway by the absence of the staff on sick leave, it is necessary to translate the figures representing the number of days lost into rupees, annas and pies. To do this successfully is rather difficult. Because, it is a well-known fact that of all the factors, the human factor is the most difficult one to monetise. Several points have to be considered in monetising human labour:—

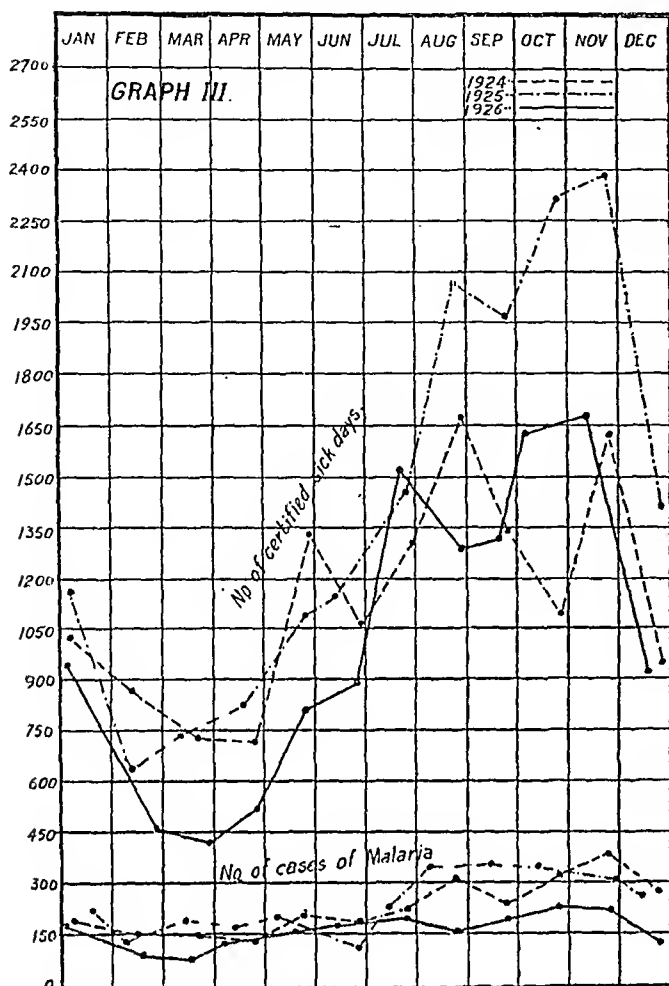
(i) Whether skilled labour or unskilled labour.
(ii) If skilled, what degree of skill is required to do the work.

(iii) Whether an experienced worker or a raw recruit.

(iv) Individual efficiency.

(v) Last but not least the mental state of the individual while performing his duty, has also to be considered. Suppose, for example, the dependents of a railway employee are sick. Naturally, the quality of work turned out by the employee while in a state of mental perturbation (brought on by domestic calamities) could not be on a par with what he may turn out in his normal mental state. We are apt to belittle the significance of this, and while it may not have any tangible effect on unskilled labour, the case is different with skilled labour.

GRAPH III.



Graph showing the relation between the number of cases of malaria and the number of days lost thereby to the railway.

N.B.—There is a fairly constant relationship between the number of cases of malaria and the number of certified sick days in the years 1924 and 1926. But in the year 1925, this relationship is disturbed. Comparatively a greater number of days were lost from malaria in this year than in the other two years, particularly during August—November.

The writer knows the case of a station-master whose wife was suffering from a bilious remittent type of malaria. Though calm and sober-minded always, he lost his mental equilibrium to such an extent (due to the illness of his wife), that he gave orders to his pointsman to receive the mail train on the platform line, while a goods train was shunting on the same line. Fortunately, the pointsman was an intelligent man and he averted a serious collision by disobeying the station-master. In a big railway administration with thousands of skilled employees, the mental factor has a definite significance.

Therefore, it is necessary to consider all the factors enumerated above in assessing the loss due to malaria.

It is admitted that the ideal method of calculation of the loss is to find out the number of days lost on account of malaria, for each employee and evaluate the loss in terms of rupees, annas and pias, bearing in mind the several factors

enumerated above. But considering the magnitude of the figures representing the number of employees, the different grades of pay, the variations in each grade, individual variations in pay and the number of days lost, etc., the ideal method becomes impracticable.

Further, it is doubtful if such a mathematically accurate estimate is necessary for practical purposes. Moreover, it is extremely difficult to assess the value of individual efficiency and the mental factor—both of some importance—in a big concern like this railway. So, making due allowance for all these factors, an easy method of calculation has been adopted:—

All the employees have been grouped into 3 broad classes:—

- Class (I) Employees whose pay ranges from Rs. 250 and upwards per mensem.
- Class (II) Employees whose pay ranges from Rs. 30 to Rs. 250 per mensem.
- Class (III) Employees whose pay is below Rs. 30 per mensem.

The number of days lost to the railway on account of malaria among Class I employees is comparatively small, for most of them protect themselves by the use of mosquito nets and take all other precautionary measures. Further, they are not exposed to the same risks as the employees of Class II and Class III, viz., night duty entailing loss of sleep, exposure to all sorts of weather in the performance of their duties, "running duties," involving travelling to endemic areas at night and halts at such stations en route, etc. The main loss is from the sickness of Class II and Class III employees.

The ratio of the number of days lost from malaria by the three different classes of employees for the 3 years is given below:—

1924	Class I:	Class II:	Class III:	Ratio
1925	do.	do.	do.	:: 1:38:91
1926	do.	do.	do.	:: 1:45:94
				:: 1:37:92

Dividing the total number of days lost to the railway from malaria by the same ratio and multiplying the resulting figures by the average pay per day for the respective class of employee, we arrive at the following figures:—

1924.

Total number of days lost by malaria 13,789. This divided by the ratio 1:38:91 and multiplied by the average pay per day, i.e., Rs. 20 for Class I, Rs. 4 $\frac{2}{3}$ for Class II and Rs. $\frac{2}{3}$ for Class III employees, the loss caused by malaria is Rs. 27,367 or Rs. 27,000 (approximately).

1925.

Method of calculation same as before. The loss caused by malaria is Rs. 35,957 or Rs. 36,000 (approximately).

1926.

Method of calculation same as before. The loss caused by malaria is Rs. 24,248 or Rs. 24,000 (approximately).

These figures represent fairly accurately or at least proportionately the amount of loss to the railway caused by malaria in the district of Lalmanirhat. That the estimate presented here errs, if at all, rather on the side of under-statement than on the opposite, will be evident from a comparison of the figures representing the savings, said to have been effected in consequence of the saving in number of certified sick days—*vide* E. B. Railway Annual Report 1926-27, Vol. I, Section I, p. 32, wherein the approximate equivalent cost of 34,769 staff days, is estimated at Rs. 37,000 which is acknowledged to be an under-estimate. Also *vide* "Report on Methods of Malaria Control on the E. B. Railway by Dr. R. J. L. Sladen," dated 15th March, 1927, page 3, wherein 8,377 days, representing the saving in days of certified sickness, has been estimated at Rs. 8,377 which is admitted by Dr. Sladen to be an under-estimate.

If the figures given by the writer (for the district of Lalmanirhat) represent the loss from one district, what about the total loss to the Railway from all the districts combined? Of course, the other districts may not be as bad as the one the writer was in charge of. Nevertheless, the total loss from the whole system must be considerably greater than the figures given for one district. Naturally such a great loss had its effect on the balance-sheet, as is admitted by the Agent (*vide* E. B. Railway Annual Report 1926-27, Vol. I, Section I, p. 31).

It may be of interest to know what percentage of the total loss from all sickness, malaria alone contributes. The total number of days lost to the railway on account of all sickness, is given below for the 3 years:—

1924.	1925.	1926.
31,829	34,158	35,112

Correlating these figures with those representing the number of days lost from malaria alone, we arrive at the following percentage:—

1924.	1925.	1926.
43 per cent.	50 per cent.	35 per cent.

These figures support the view expressed in an earlier part of this paper, viz., that 1925 was a very bad year, both from the Railway administrators' and from the staffs' points of view. There is also a perceptible reduction in the loss from malaria in the year 1926 as is evidenced by the fall in the percentage of malarial loss from 43 in 1924 to 35 in 1926. It is needless to say that this fall explains the efficacy of the anti-malarial measures started in 1925 by the Chief Medical Officer with the enthusiastic support of the Agent.

SUMMARY.

(1) A brief description of the physical features of the Lalmanirhat district of the E. B. Railway together with its malarial distribution has been given.

(2) The district comprises areas of varying physical features with different degrees of malarial incidence.

(3) The number of cases of malaria and the number of cases of all other sickness in the district for the 3 years 1924, 1925 and 1926 are given for comparison.

(4) The number of days lost to the Railway on account of malaria amongst the staff is given, and this is compared with the number of days lost from all other sickness.

(5) The monetary value of the number of days lost from malaria has been estimated for the 3 years 1924, 1925 and 1926 and this has been shown to be not a negligible amount.

(6) What percentage of the loss from all sickness does malaria alone contribute? This has been calculated and incidentally the anti-malarial measures started in 1925 have been shown to have been effective in reducing the loss due to malaria from 43 per cent. in 1924 and 50 per cent. in 1925 to 35 per cent. in 1926.

Finally, the writer takes this opportunity to express his indebtedness to Dr. R. J. L. Sladen, F.R.C.S., D.P.H., the then Chief Medical Officer, E. B. Railway, for kindly providing him with all the necessary facilities and for valuable advice and guidance.

The writer's thanks are also due to Dr. C. D. Newman, the D. M. O. of Saidpur for his help and advice.

REFERENCES.

- (1) Sir Ronald Ross (1911). "The Prevention of Malaria," p. 252.
- (2) R. J. L. Sladen, F.R.C.S., D.P.H. (1927). "Report and Methods of Malaria Control on the E. B. Railway."
- (3) E. B. Railway Annual Report (1926-27). Vol. I, Sec. I.

OBSERVATIONS ON 8 CASES OF BLACKWATER FEVER, TREATED WITH SERUMS AND ALKALIES.

By S. J. BELLGARD, D.M.C. (Cal.), L.T.M.,
D.T.M. (Bengal),
Medical Officer, E. B. Railway, Purnea.

Geographical Distribution.

BLACKWATER fever is met with in intensely malarious districts, with high endemic indices. Dinajpur district in North Bengal is specially mentioned by Sir Leonard Rogers in his book on "Fevers in the Tropics" as one of the districts with a notoriously high mortality; this obviously accounts for the occurrence of blackwater fever.

During the 18 months I was in the district as Medical Officer of the Dinajpur Ruhea Construction, E. B. Railway, of the malaria cases which came under my observation, 90 per cent. were *Plasmodium falciparum* infections.

Seasonal incidence.

	Number of cases during the			
	1st	2nd	3rd	4th qrs.
Blackwater fever ..	0	0	6	2
Malaria ..	459	293	897	732

The above table clearly shows that blackwater fever cases were most numerous when malaria was at its height. Thus it is apparent that malaria plays an important part in the causation of blackwater fever in conjunction with some factor still obscure.

Species of Anopheles mosquitoes found in this district.

<i>A. culicifacies.</i>	<i>A. vagus.</i>
<i>A. barbirostris.</i>	<i>A. fuliginosus.</i>
<i>A. sincnsis.</i>	<i>A. philippincensis.</i>
<i>A. umbrosus.</i>	<i>A. funestus.</i>

Among the above mentioned species prevalent at the time, *A. sincnsis*, *culicifacies*, and *barbirostris* were numerous and heavily infected. The presence of the above three species, which are well-known carriers, accounts for the high incidence of malaria in epidemic form in the 3rd quarter. Following the hæmolysin theory of damaged liver and lowered salt content of the blood, I adopted serum treatment together with alkalies.

The following are the details of treatment:—

(1) The diagnosis being confirmed as blackwater fever, the patient was given 10 c.cms. of anti-streptococcus serum intravenously, followed after 8 hours by 5 c.cms. of hæmostatic serum by the same route.

(2) Malaria parasites were found in the blood in large numbers in cases 1, 2 and 8, so desensitizing doses of quinine hydrochloride and sodium bicarbonate were given for 2 days.

(3) Alkali mixture consisting of:—

Sodii bicarb.	..	..	grs. 30
Sodii sulph.	..	..	grs. 10
Sodii benzoas.	..	..	grs. 15
Sodii citras.	..	..	grs. 5
Liq. Adrenalin hydrochlor. (P. D. & Co.) (1 in 1,000)	..	..	min. 10
Aqua	..	..	ad. oz. 1
Sig. one mark every 2 hours.			

(4) Glucose and saline per rectum, in the following proportions:—

Liquid Glucose, drachms 2.
Normal saline, ounces 10 b. d.

(5) Continuous application of hot water bottles over loins.

(6) The patient throughout his illness was strictly confined to a liquid diet consisting of whey, barley water, and ice to suck when there was a great tendency to vomiting. No alcohol was administered throughout the treatment.

I might mention that the alkali mixture was discontinued if the patient complained of terrible burning sensation all over the body, and Hearesay's mixture (modified) given.

Sodii bicarb.	..	..	grs. 30
Liq. Hydrag. perchlor.	..	..	dr. $\frac{1}{2}$
Aqua	..	..	ad. oz. 1
Sig. one mark every 2 hours.			

(7) Hot fomentations, 4 hourly, with 1 c.c. of pituitrin if the abdomen was tympanitic.

DETAILS OF CASES TREATED.

Case No. 1.—Mahommedan male, aged 46 years. Resident of the district. Case seen on the first day of disease. Previous history of malaria. Ten c.c. anti-streptococcus serum intravenously was given immediately, lower bowel evacuated by a large saline enema, alkali mixture 2-hourly alternately with desensitizing doses of quinine and sodii bicarb. Glucose and saline b.d., hot fomentations to loins continuously with a hot water bottle. Urine showed signs of clearing up 8 hours after the injection; 5 c.c. of hæmostatic serum was given and the following morning the patient passed clear amber coloured urine. Recovery in this case was rapid, he was subsequently kept under treatment for 14 days, without return of any symptoms.

Case No. 2.—Hindu male, aged 36 years, Inspector of Police, Bochaganj. Residing in the district for 2½ years. Previous history of malaria. Seen on first day of disease. The same treatment was followed, recovery was a bit delayed as his was a very serious case and he had persistent hiccup for the first 2 days. Cases 3, 4, 5, 6, 7, were milder cases, and they all responded well to treatment.

Case No. 8.—Hindu male, aged 42 years, a relapse case, merchant, a permanent resident of the district. previous history of malaria. Seen on first day of disease. This case was undoubtedly of a serious nature being a relapse; he unfortunately did not carry out my instructions and ultimately died on the 4th day. I might mention a few points in his case which may be of interest. After the 2nd serum injection he felt comparatively better and his urine cleared up considerably, a faint pink colour remaining. On the 4th morning he insisted on my giving him some solid diet which I refused. At about 2 p.m. of the same date I was sent for by his relatives who stated that his abdomen was swollen and that the patient was in great pain. On making enquiries I found that the patient had insisted on having a hearty meal of dal and rice which was foolishly given him by his wife. His abdomen was acutely tympanitic and there was complete retention of urine. The bladder was emptied by a catheter, hot fomentations over loins with 1 c.c. of pituitrin were given, 4-hourly, without any success; the patient succumbed after 4 hours.

The malarial origin of blackwater fever from the history of these cases seems obvious for the undermentioned reasons.

1. The susceptibility of a community to blackwater fever exposed to intense malaria.

2. It was noticeable that blackwater fever cases occurred when malaria was at its height, and subsequently declined with a fall in the incidence of malaria.

3. Quinine prophylaxis was seldom or never carried out, accounting for the high endemic index.

4. Length of residence in the district is another fact accounting for the close relationship of malaria with blackwater fever.

In conclusion since these cases responded to anti-hæmolytic treatment, I would like to suggest the possibility of a hæmolysin being present in the blood brought about by some pathological condition which is still obscure.

"MASSAGE IN THE TREATMENT OF VENOMOUS SNAKE-BITES."

By LUCIUS NICHOLLS, M.D., B.C., B.A. (Cantab.),
Director of the Bacteriological Institute (Ceylon).

WHERE poisonous snakes exist there will be found people who profess to be able to cure snake-bites. These people may be generally designated "bush doctors." The methods of

treatment pursued by some of these have some similarity to the methods of bone-setters.

Many years ago I first witnessed the rough treatment of a "bush doctor" for snake-bite. It was in the West Indian Island of St. Lucia where there exists the Fer-de-lance (*Lachesis lanceolatus*), a viper which grows to over four feet in length.

One day I received information that a youth had been bitten by one of these vipers and the scene of the accident was about five miles from my bungalow. I went as quickly as possible to his assistance and I arrived about 2½ hours after he had been bitten. The patient was a robustly-built Mulatto of about 17 years of age, he had been bitten on the outer side of the fleshy part of the calf of his right leg. He was undergoing treatment at the hands of an old negro "bush doctor," who had enlisted the services of two bystanders; the three of them were vigorously scrubbing the skin of the youth with tightly screwed up bunches of herbs. The rubbing was such that the bunches quickly frayed and wasted, when the "bush doctor" went to the nearest jungle growth and gathered any weeds he found and made fresh bundles for the scrubbing.

He made little selection of any particular weeds, except that he seemed to prefer those with rough stems.

The patient was not kept in one position for more than about a minute, he was turned over and over, and not a square inch of his skin was allowed to escape, even his scalp and the soles of his feet were rubbed. And further, the rubbing was accompanied by pressure on the deeper structures, which might pass as massage of the muscles.

This treatment had been given for about two hours; and because it appeared to be brutal and to be exhausting the patient, I persuaded them to cease, whilst I gave the youth stimulants and injected a strong solution of potassium permanganate into the site of the bite.

I left about half an hour later, and I do not know whether or not the "bush doctor" continued the treatment. Thirty-six hours later the patient had almost recovered from the snake-bite and the treatment of it, except that his leg was very swollen and there was an area of gangrene about three inches in diameter around the site of the bite. It was many weeks before the leg finally healed.

There are "bush doctors" in Africa who make use of similar methods of rubbing and massage in their treatment of snake-bite. They often assert that the rubbing must be done with herbs known only to themselves.

Cases have been recorded in Ceylon where patients have been treated by being vigorously rubbed with lime-juice; and again plantain-juice is used in other cases.

It is impossible to decide the value of treatment in any case of snake-bite, because it can never be known whether or not the snake has injected a lethal dose of venom. Yet there is a

reasonable explanation why rubbing and massage should be of value in snake-bite.

After venom has been injected beneath the skin, the portion which does not combine with the tissues near the site of the bite quickly reaches the blood-stream and is distributed throughout the body. When the patient is at rest there is proportionately more blood passing through the organs and tissues supplied with involuntary muscles than through the skeletal muscles and the other tissues of the body. Therefore the heart, diaphragm, the intestines and other important structures will receive a relatively larger quantity of venom than the muscles and tissues which are at rest.

When the skin is vigorously rubbed, the capillary vessels are dilated and an increased volume of blood passes through the skin; and the same occurs in the skeletal muscles when they are massaged.

Therefore it is probable that vigorous massage and rubbing will cause much of the venom to combine with the muscles, skin and subcutaneous tissue and prevent a proportionately large quantity from acting upon the "vital" organs within the thorax and abdomen.

It follows from this that rest and quiet are contra-indicated for the first few hours after snake-bite and that rubbing and massage with some embrocation or mild vegetable irritant are indicated.

(This explanation of how massage may possibly act in a case of snake-bite is ingenious. Another amateur method of treatment is to make the patient walk about; much the same action would occur here, though less satisfactorily. We have shown this paper to Lieut.-Col. H. W. Acton, I.M.S., who comments as follows:—

"With viperine poisoning a certain amount of fixation occurs when a ligature is put on and the circulation stops, as by this means one can save animals from the effects of several lethal doses. I have not experimented with massage and would have thought that it would tend to drive the venom into the circulatory system rather than to fix it. Massage would be useless in colubrine poisoning, as the venom does not become fixed on the local connective tissues, but only in the brain."—Editor, I.M.G.)

DIPHTHERIA AN EVER-PRESENT DANGER IN INDIA: A REPORT ON A SERIES OF CASES IN BILASPUR DISTRICT, CENTRAL PROVINCES, INDIA.

By V. C. RAMBO, M.D.

ON arrival in India two conflicting reports came to the writer's attention. One was that diphtheria is exceedingly uncommon in India and need not be feared or expected. The other, that four young boys of the Mission of which he was a member had in previous years lost their lives, two having suffered from definitely diagnosed diphtheria where no antitoxin was available until too late, and two (not diagnosed diphtheria) of some disease with sudden onset which caused

choking and cyanosis after a period of sore throat and fever and great intoxication. In one of the cases the parents, who suspected diphtheria, were notified by the civil surgeon that the case could not be diphtheria because "there is no diphtheria in India."

Other reports reached us that in Kashmir State, in the United Provinces, in South India, and in Bengal, children of Europeans had died from diphtheria.

It is to refute the common idea that diphtheria is not present and not to be feared in India that this small series of cases is presented. It is to be hoped also that no hospital or dispensary where any European children are likely to come for treatment will ever be without diphtheria antitoxin and that, when in doubt concerning a case, antitoxin will be administered first and a definite diagnosis made afterwards. Atypical types are the rule; therefore more than ordinary care must be taken in looking at all suspicious throats and following the slogan, "Safety First."

Case 1.—Victor T., of Bishrampur, Bilaspur District. European, age 3 years. On November 12th, Victor went to a picnic to a neighbouring village perfectly well and healthy. On the 15th he developed a cold. This became more severe and on the 17th the tonsils were swollen but no spots or membrane were present. Diagnosis acute tonsillitis. On November 18th, there was no cause to change the diagnosis as the tonsils and throat were simply congested and only one yellow spot was noted on the tonsil. On the 19th, however, the patient started choking. Laryngeal diphtheria was diagnosed and antitoxin was administered. The choking was relieved and also the dyspnoea, but the patient died on November 20th at 10 a.m. of heart failure.

Case 2.—Rachael, Victor's sister, 6 years old, also went to the picnic perfectly well on November 12th, 1928. She vomited on returning and was given castor oil after which there were no symptoms until the 15th when she too developed a cold. On the night of the 16th there were small "specks" on her tonsils. On the 17th she was diagnosed acute tonsillitis along with her brother. On November 18th she went to bed and was cheerful, tonsils swollen as before, diagnosis as before. November 19th symptoms continued. November 20th diphtheria antitoxin was administered. Recovery was uncomplicated. Diagnosis, diphtheria.

On November 20th prophylactic antitoxin was given to all Europeans in the station.

Case 3.—One month later, December 15th, 1928, John, European, age 12, Bishrampur, developed diphtheria with typical membrane. Antitoxin was given, followed by complete, uneventful recovery.

Case 4.—Mr. K., John's father, immediately afterwards, December 16th, showed definite signs and symptoms of diphtheria. On giving antitoxic serum there occurred a very severe anaphylactic reaction followed by dyspnoea from oedema

of the glottis and general anasarca. Recovery was complete after a stormy convalescence.

Case 5.—Mrs. K., at this time had malaria and simultaneously with her son's and husband's cases developed diphtheria also. Antitoxin was given and a quick recovery followed.

Case 6.—The history is given here of an Indian boy of 17 years living in Bishrampur who developed an apparently simple sore throat followed by partial recovery but who, a week later, had severe hæmorrhage from the throat or post-nasal space which area as well as his whole mouth was now covered with a grey diphtheritic membrane. One week later after apparently greatly improving, he died suddenly of heart failure.

Case 7.—On January 12th, 1928, a relative of the tahsildar, Mr. R., a small girl child 5 years of age, suffering apparently from a simple cold was brought to the dispensary of the Mungeli Area Christian Hospital by a servant. On looking at her throat a very extensive greyish membrane was seen over both tonsils and the pillars of the fauces. A smear showed the Klebs-Loeffler bacillus. Antitoxin was given immediately and a note written to advise the child's isolation and further observation and need for further injections. Upon inquiry later, it was found that the child had been sent home to the United Provinces immediately after her visit to the dispensary. Recovery was apparently complete.

(It is an interesting conjecture as to the number of persons infected during this child's return over the four hundred miles journey home to her people.)

Case 8.—February 20th, 1928, an Indian girl child of Mr. P. S., Pastor of Mungeli Christian Church, was reported as having had sore throat and fever particularly resistant to treatment. Observation presented a girl child of 2 years, fairly toxic in appearance, fever 100° and a sore throat with very irregularly shaped ashen-grey patches of membrane which did not brush away easily and whose smear with methylene blue showed many banded and clubbed bacilli with typical arrangement in groups. Diphtheria was diagnosed and antitoxin 5,000 units was given. The fever was normal the next morning and recovery was uncomplicated. Vincent, the older brother 5 years of age, was given a prophylactic dose and never presented any symptoms or positive smears of the disease. This child's father had a few days previously returned from Jubbulpore and also presented the bacilli in a smear; the organisms persisted for ten days and cleared up without any symptoms or antitoxin, as antitoxin was refused by both of the child's parents. The mother's throat smears were at no time positive. The suggestion is made that this man was a carrier bringing the disease from some infected person whom he met on his journey.

Case 9.—On March 2nd, 1928, the writer's daughter, age 3½ years, developed a sore throat in Mungeli. The next morning she was listless and toxic and complained of her throat

being painful. The temperature was 100° and apparently rising. The examination of the throat showed a dirty ashen-grey membrane on each tonsil. The membrane on each tonsil was firmly attached, not giving away on being briskly rubbed with a cotton swab. Smears showed typical Klebs-Loeffler bacilli, but only after a rather long search. No culture material being available a culture was not taken. At 12 o'clock noon of the same day, the temperature was 101° and the toxicity had greatly increased. Antitoxin 10,000 units was given under the scapula. The fever rose no further and gradually came down towards evening. During the night and early morning, though the temperature was 97° , the pulse continued 130 and in the child's sleep the respiration was laboured and of a character suggestive of that seen in shock with cardiac failure. The next morning there was marked improvement. The membrane was gone that evening and recovery was uncomplicated.

The patient was kept in bed for nine days—with difficulty. All European children and adults were given prophylactic doses of antitoxin. No other cases appeared and ten days later all throats were negative for diphtheria bacilli.

Case 10.—On March 5th, 1928, in the Jackman Memorial Hospital, Bilaspur, Paul M., a slight, fair European boy of 8 years with very diseased tonsils and adenoids was operated upon by Dr. Nicholson and the offending members removed. Recovery was not as rapid as desired, but on March 12th he was sent home to Sakti with his throat presenting nothing abnormal considering his post-operation condition. His father and mother and three-weeks-old baby brother accompanied him. At home he was apparently recovering when on March 14th he started to have difficulty in breathing. He was rushed to Champa where antitoxin was given and then on to Bilaspur, where he was brought in a moribund condition from the 5-30 train in a tonga 3 miles to the hospital, where in spite of further antitoxin he died of heart failure, his throat covered with the ashen-grey membrane.

Case 11.—Following Paul's death his baby brother, 3 weeks old, had prophylactic antitoxin. However, notwithstanding this precaution on March 21st, this little infant developed sore throat and hoarseness and was at once taken to Champa. Dr. H. Bowman found many kinds of organisms; staphylococci, streptococci, bacilli, diphtheroids and also quite typical diphtheria bacilli. At Champa, additional antitoxin was given. He made an uneventful recovery.

No further cases have appeared until May 22nd, 1928.

Notes on possible Epidemicity.

With our insufficient knowledge, the possible source of infection of these cases cannot be definitely traced. That the Bishrampur cases came from one source and the later contacts from those infected is possible. The child, the first case in Mungeli, Case 7, probably was an

imported case, perhaps infected on the train. Even though there were many uninoculated contacts with this child, it is to be noted that none became infected.

P. S. probably brought the organisms from some source on his trip to Jubbulpore, and gave the disease to his child. That he was not a permanent carrier is shown by the fact that shortly after his daughter's recovery his throat was negative for diphtheria bacilli and that no other case followed.

Before the infection of Case 8 was known, P. S. had visited in the home of the writer though he was at no time near his daughter. If such was the case, it is interesting that the disease took such a long time to develop. Prophylaxis should have been given but insufficiency of antitoxin prohibited this step. By the time a new stock had come, it was needed for treatment. All the Europeans were inoculated at this time as noted before and no further cases developed.

The question of Indians not being susceptible to diphtheria, or very slightly so, is apparent—death occurring in the Indian youth only after very extensive membrane formation. The first Mungeli case recovered from a rather severe attack with only 2,000 units antitoxin. The Schick test used on a large number would throw light on this question.

SUMMARY.

Eleven cases of diphtheria are presented, all of which were authenticated by a trained observer and many by smears. Of the eleven cases, eight were children and one a youth. Of these, three were Indians, two of whom were girls and one a young man. Of the six European children, three were girls and three boys. Of the adults, one man and one woman were affected. In all cases antitoxin was used. There were 3 deaths. One case showed a dangerous, almost fatal anaphylactic reaction as he had had antitoxic serum one month previously.

CONCLUSION.

Diphtheria appears from time to time and should be thought of and looked for in all cases of colds and sore throats. Atypical cases should have special attention and antitoxin should be given immediately where there is any doubt whatever.

Diphtheria antitoxin should be kept in sufficient quantities in all dispensaries or stations where there are children, Indian or European.

All school children should have toxin antitoxin administered where the Schick test is not used as in the Kodaikanal School for Missionaries' Children, and to all those susceptible following the Schick test if this more scientific method of finding those susceptible is used.

The need for further investigation concerning the susceptibility of Indians to diphtheria is mentioned.

My sincere thanks are due to Dr. M. C. Lang of Baitalpur, Dr. H. Nicholson of Bilaspur

and Dr. H. Bowman of Champa who have kindly allowed me to published their cases.

Comments by Dr. M. C. Lang on his cases at Bishrampur.

"In regard to the diphtheria cases, I would say that the first thing I learned was not to expect a text-book picture. In only 3 cases did I see anything at all like the grey membrane of the text-books. In one fatal case, Victor, the throat was simply congested and one small yellow spot was noted on the tonsil. Rachael's case looked for all the world like a simple case of follicular tonsillitis.

The second point is that I feel justified in giving all our missionaries' children who complain of sore throat antitoxin at once, as I do not know of a single case of sore throat among them which was not diphtheria.

The Indian boy undoubtedly had diphtheria as he had a definite membrane over the whole of his tonsils and palate which spread over the mouth cavity."

TECHNIQUE FOR LEISHMAN'S STAIN SUITABLE FOR "FIELD" APPLICATION.

By J. C. CHUKERBUTI,

CAPTAIN, I.M.S.,

Commanding Indian Military Hospital, Risalpur.

(1) SELECT an inch of the most homogeneous portion of the slide.

(2) Draw a perpendicular boundary line on either side with a grease pencil, or better with a piece of ordinary candle, which is less expensive.

(3) Pour as much freshly prepared Leishman's stain as will cover the enclosed space, and let it dry thoroughly on the slide, preferably in the air, or over a gentle distant flame.

(4) Hold the slide with a pair of dressing forceps, dip it into methylated spirit kept in a wide mouth bottle always well corked and opened only at the time of carrying out this step, and shake it well in the spirit until the film becomes a greyish pink colour. Too much decolourization will not entail restaining, because even if the white blood cells have lost their nuclear staining, the parasites retain their characteristics. Too little may entail a residual deposit.

(5) Wash in a jet of tap water.

(6) Blot immediately, dry and mount.

(7) If sediment is still present, repeat (4), (5) and (6).

I have not been using any distilled water in staining blood films with Leishman's stain since 27th October, 1927, when I first tried this method and the result is very satisfactory.

Perfectly clean homogeneously stained fields show malaria parasites in bold relief even in their earliest stage. The nuclei of white blood cells are stained deep violet, and the neutrophilic and acidophilic granules are beautifully shown up.

I have further observed that methylated spirit used for decolourization does not lose its fuel capacity and can be used for lighting primus stoves and burning in spirit lamps.

More than two hundred 1 inch \times $\frac{1}{2}$ inch films can be effectually decolourized by dipping and shaking them in 4 ounces of methylated spirit kept in a wide mouth bottle, well corked and opened only when required, until the spirit loses its decolourizing power but retains its fuel property absolutely intact.

The colour of the stained film will depend on the degree of purity of methylated spirit which should be neutral in reaction.

Appearance of Parasites and Cellular Elements Stained by this Method.

Red Blood Cells—Shades of greyish pink.

Nuclei—Deep violet or shades of violet.

Acidophile granules—Red.

Basophile granules—Deep violet.

Neutrophile granules—Lilac.

Blood platelets—Violet.

Malarial parasites—Shades of blue.

Chromatin—Ruby red.

This method is not suggested as an improvement on the historical Leishman's technique, but as a rough "field method" to be used where pure distilled water free of CO₂ is difficult to obtain.

(This method is not entirely original, nor does Captain Chukerbuti claim that it is an improvement on the standard method. We are publishing this to draw attention to a method which is particularly suitable for field conditions and which, in our own experience, gives good results.—EDITOR, I.M.G.).

AN EPIZOOTIC IN SQUIRRELS AT KUMBAKONAM.

By K. S. RANGANATHAN, I.M.P.,

Sub-assistant Surgeon.

(From the King Institute of Preventive Medicine, Guindy, Madras.)

BETWEEN 28th September 1927 and 6th October 1927, spleen smears from four squirrels found dead in two adjacent bungalows in Kumbakonam Extension were received at this institute. All of them showed bacilli morphologically indistinguishable from plague bacilli. Spleen smears from many rats found dead were later received, but these were all negative. It was decided to inquire into the cause of death among squirrels and I was sent in charge of an investigation unit for the purpose. The following are the findings of the investigation on the spot:—

A squirrel was seen on 16th September 1927 to crawl on the ground and die in a few minutes in the Sub-Collector's compound at Kumbakonam. The dead squirrel was thrown away. Whether any more died in or around the bungalow between the 17th and 22nd September was not known as the officer was away in camp. Between the 23rd and 25th, five more

squirrels died in a similar manner in the open yard at the back of the bungalow. The one that died on the 25th was examined and found to show bacilli resembling *B. pestis*. The other four were not sent for examination. On the 4th October, two more were found dead in a room upstairs and both of them were found infected with similar organisms.

Another squirrel was found dead in a bungalow about two furlongs from the Sub-Collector's on the 2nd October. Smears from this squirrel showed similar bipolar stained organisms. So it is very likely that all the unexamined squirrels found dead also had a similar infection.

Deaths among rats were reported from five places in the town between 11th October 1927 and 18th October 1927, but smears from all these rats were found to be negative to plague. No cases of human plague occurred.

Squirrel falls were confined to the Extension, while the rat falls were restricted to the town proper. Instructions were, therefore, issued that squirrels were to be caught only in the Extension, particularly in the compounds of infected bungalows, but that rats were to be trapped evenly in all parts of the town so that the rats caught each day would represent a fair sample of the rats of the town. Every endeavour was made to procure as many squirrels and rats alive as possible. A record was maintained showing the places where the rats were trapped and the squirrels caught.

Dissection of all the animals was done by me. Diagnosis by naked eye examination alone was never relied upon and smears from organs were examined microscopically in every case. Live squirrels and rats were chloroformed and killed. Fleas, if present on them, were collected. They were then dissected and abnormal appearances were recorded.

114 squirrels were examined in all. No abnormal appearances were observed in any of them and smears from the spleen and liver showed no plague bacilli.

113 rats were dissected which were of the following species:—

1. <i>R. rattus</i>	..	..	92
2. <i>R. norvegicus</i>	..	..	20
3. Bandicoot	..	..	1
Total	..	..	113

As most of the traps were set in houses, *R. rattus*, the common house rat, was trapped in larger numbers. No abnormal appearances were noted in any of the rats and smears from the spleen and liver from these showed no plague bacilli.

Fleas.—One hundred and thirty-one fleas were collected from off 40 rats which is an average of 3.2 per rat. Fleas were not found on the other rats, presumably because some time had

elapsed before the rats were brought to the laboratory. Further the traps had not been at once enclosed in flea proof bags.

The following species of fleas have been identified:—

Species.	Number.	Percentage.
<i>Xenopsylla astia</i>	.. 123	93.9
<i>Xenopsylla cheopis</i>	.. 7	5.3
<i>Ceratophyllus</i>	.. 1	0.8
Total	.. 131	

Only five fleas were found on squirrels and these on only four out of 114 squirrels caught. They were all of the species *Ceratophyllus argutus*. They were identified by Mr. Shariff of the Zoological Survey of India and the other fleas by Mr. P. V. Seetharama Iyer, M.A., of the King Institute of Preventive Medicine, Guindy, Madras.

Sources of infection.—The exact source of infection—if it was plague—and the manner of importation could not be traced out on account of the large number of persons who had access to the bungalow and the long interval that elapsed between the beginning of the epizootic in squirrels and the commencement of the investigation.

CONCLUSIONS.

1. The occurrence of an epizootic of what looks like plague in squirrels without coincident disease in rats or men is recorded.

2. A rat flea survey of Kumbakonam—though a limited one—shows the huge preponderance of *Xenopsylla astia* (93.9 per cent.) over the plague-carrying species *Xenopsylla cheopis* (5.3 per cent.). *Ceratophyllus* accounted for the small remainder of 0.8 per cent. of the rat-flea population.

3. All the squirrel fleas were found to belong to the species *Ceratophyllus argutus*.

4. In the absence of cultural or animal inoculation tests one cannot be certain whether the disease in squirrels was caused by *B. pestis* or *B. pseudo-tuberculosis rodentium*, but morphologically the appearances were typical of *B. pestis*.

My thanks are due to Major H. H. King, I.M.S., Director of this Institute, for permitting the publication of this article.

A Mirror of Hospital Practice.

A CASE OF GLIOMA (EMBRYONAL NEUROCYTOMA) OF THE BRAIN SIMULATING PITUITARY TUMOUR.

By K. G. PANDALAI, M.B., F.R.C.S.,

MAJOR, I.M.S.,

Surgeon, General Hospital, Madras.

and

T. BHASKARA MENON, M.B., M.R.C.P.,

Department of Pathology, Medical College, Madras.

T. V., a young Indian Christian aged 30 years, was admitted to the surgical

wards of the General Hospital, Madras, on 22nd January, 1928, with a history of severe headache of 6 months' duration. Later, he noticed slight dimness of vision which gradually increased. Next he had double exophthalmos. There was also a history of occasional vomiting.

On admission, patient had vomiting of a cerebral type with bilateral exophthalmos more marked in the right eye. There was marked papilloedema on both sides with left-sided facial paralysis. Romberg's sign was present. X-rays showed pituitary fossa enlarged and the shadow of a tumour with a calcified centre. Wassermann reaction was negative.

The diagnosis was a tumour in the region in front of the chiasma pressing on the optic nerves on both sides, causing widening or erosion of the sella turcica and impeding the venous circulation on both sides resulting in exophthalmos. Though signs of endocrine disturbance were not noticeable, a tumour which could cause such bilateral signs was regarded as possibly of pituitary origin.

The tumour appears to have arisen from the floor of the 3rd ventricle in connection with the optic thalami and to have grown forward underneath the frontal lobes as a soft grey mass of the size of an orange. It has made its way down displacing the frontal lobes and hanging as a pedunculated mass which has perforated the ethmoid plates on both sides and through the ethmoid bone made its way into the orbit causing diffuse infiltration of the tissues of both eyes, pressure on the optic nerves and bilateral exophthalmos. To the naked eye, the tissue is soft and friable and shows small hæmorrhages. The growth cannot be well demarcated from the rest of the brain tissue on the left side where it has infiltrated the pia mater and the dura at the base of the brain as well as the left frontal lobe to a slight extent. But the whole of the mass is well defined on the right side where its point of origin can be made out.

Microscopically, the tumour consists of cells which are rounded or cuboidal with scanty fibrils here and there. A palisade arrangement may



Fig. 1.—Neurocytoma. Showing the round and cuboidal cells that make up the growth, the palisade arrangement of the fibres and also the arrangement of cells round the vessel. (x 312).



Fig. 2.—Photograph of the tumour showing its origin near the floor of the third ventricle marked by an X. Note how the tumour grows forward displacing the frontal lobe upwards.

Operation Notes.—On 1st February, 1928, a large right-sided frontoparietal osteoplastic flap was raised. The brain was pulsating. The dura was opened but the brain bulged out to the height of an inch. An attempt was made to elevate the frontal lobe but the pressure was too great and the cortex was torn. The attempt was given up to be repeated at a second stage a few days later. The bone flaps were removed as the skin could not be sutured otherwise. Rectal ether anaesthesia was employed with local novocain infiltration. Patient died on 7th February, 1928, without recovering consciousness.

Pathological Note.—By T. Bhaskara Menon, M.B., M.R.C.P.

be made out in the fibrils. There is no definite arrangement of the cells into pseudo-rosettes, but a grouping round the blood vessels is evident in parts of the growth. But for the fibril formation of the cells, which may be made out in places, to the uninitiated eye the tumour appears like a round-celled sarcoma.

Following Bailey and Cushing's division of the gliomata into thirteen different groups, one would place this tumour among the embryonal neurocytomata, which are tumours derived from the embryonal cells that line the medullary plate. With regard to the origin of these fibrils one view is that the neurocytes themselves form fibres in the process of development into what have

been called spongioblasts. Another view is that the fibrils are derived from neuroglia cells which are included in the growth. Whatever view is correct, it must be understood that the neurocyte is the cell that forms the medullary epithelium of the medullary groove which forms the brain vesicles. Some of these cells become elongated and form fibres and are called spongioblasts which are the precursors of the adult neuroglia cells, the astrocytes. Others become differentiated into neuroblasts which are the precursors of the nerve cells. It is of interest to note that neurocytomas of similar structure may originate in the retina in children and spread up into the brain and even to the corresponding eye on the other side.

REFERENCE.

Bailey and Cushing. Tumours of the Glioma Group. Philadelphia, 1926.

VERTICAL SQUINT OF HIGH DEGREE IN WHICH BINOCULAR SINGLE VISION WAS MAINTAINED IN COM- PARATIVE COMFORT.

By R. E. WRIGHT,
LIEUTENANT-COLONEL, I.M.S.,
and

V. G. MUTHAYYA, P.M.S.,
Government Ophthalmic Hospital, Madras.

MR. X., European, aged 35, has very little to complain of except that the head tilt and blinking movements of the lids which he has adopted to enable himself to get single vision for distance make him feel somewhat self-conscious. He thinks that the trouble is due to his right eye having been injured at birth by the accoucheur's instruments. He is inclined to see double except when reading or looking down at near objects, but is enabled to maintain distant single vision by the manoeuvres noted above. These movements have to be frequently repeated in the ordinary course of his daily life.

On investigation of the case, it appeared that Mr. X was a perfectly fit healthy-looking individual of cheerful disposition and, in spite of his self-consciousness, quite inclined to mix freely with his fellow men. He was, moreover, successful in his work and highly thought of. He maintained a very erect attitude with straight back, chest thrown out, head thrown back and tilted to the left shoulder. In this position while engaging him in conversation, one noted that the lids drooped a little and that every few moments he made a series of three or four small quick movements of his head, tilting it up a little more, at the same time the lids made a series of short deliberate blinks after which steady fixation was resumed. He states that his earlier photographs do not show any head tilt, but that in those taken after 12 years of age, the condition is definite. He had measles and neurasthenia (?) not long before the head tilt was established, but did not

have any other serious disease of childhood. His vision is 6/5 in each eye. With the head placed straight so that the eyes should assume the primary position, there is vertical squint of 25° (prism measurement). He can fix with either eye, but the tendency to fix with the left is greater. He has, therefore, a hypertropia which becomes a hyperphoria on tilting; the tendency to deviation is, however, great and fixation is maintained with difficulty. He gets double vision frequently as the fixation breaks down, but it does not worry him except that it gives the indication for blinking and tilting and picking up single vision again. He has binocular vision for near objects and no difficulty in maintaining steady fixation.

Tested with the Duane's screen it is found that the elevators of his left eye are at fault, but although the vertical diplopia is more marked in the upper and outer field when the false image is seen by the left eye, a certain degree of committance has become established. The question of operation arose and recession of the left inferior rectus was discussed, but it was considered sound judgment to leave well alone in view of the fact that the patient had no symptoms except the intermittent diplopia which did not worry him as he was able to correct it immediately. The self-consciousness had evidently been largely overcome by the patient's pluck and philosophical outlook.

A CASE OF HÆMORRHAGIC PLEURISY.

By GANESH DASS, S.A.S.,
Bahawalnagar, S. P. P., Punjab.

A PATIENT named Lal Shah of the labouring class was carried to hospital for the treatment of the following complaints; he suffered from cough, shortness of breath, constant pain in the abdomen, slight fever and palpitation of the heart during the early days of November, 1927.

History.—He was bitten by a snake of the viper variety a fortnight before and was said to have been cured by quack's treatment in a week's time, but he subsequently developed the above complaints.

It is unnecessary to give complete and descriptive details of the signs and symptoms of the disease he was suffering from but on thorough examination, a provisional diagnosis of total empyema of the right side of the chest was made. While confirming the diagnosis by the exploring needle, I found it to my great surprise to be a case of hæmothorax. The question arose as to whether the removal of such a large quantity of blood would be safe.

Treatment on simple lines for the absorption of fluid was considered necessary for a few days but failed and as the life of the patient was threatened by direct pressure on the heart and subjacent viscera, about 5 lbs. of bloodstained jelly-like opalescent serum was evacuated by Potain's aspirator; at the same time I prepared

to meet with subsequent complications. Immediately after the operation an intramuscular injection of calcium chloride gr. 5 in 10 c.c. of sterile distilled water was given in the buttocks to prevent further hæmorrhage into the cavity and an intravenous injection of tr. iodi. min. 22 in 10 c.c. normal saline to counteract viper poison in the system was also administered.

The patient passed the night quite comfortably and next morning he was quite cheerful as he had had no sleep for the last ten days, but all of a sudden, as was expected, he began to develop cardiac failure. Injections of pituitrin 1 c.c. and adrenaline min. 10 were continued alternately every four hours and a stimulant mixture containing tr. digitalis min. 10, was given every four hours for two days consecutively; the patient rallied and made an uneventful recovery after four days further stay in hospital.

Points of Interest.—(1) In general practice hæmothorax is relatively uncommon, though I have seen a few cases of snake-bite poisoning with complications of hæmorrhages from nose, gums, hæmatemesis, hæmaturia, melæna and petechial hæmorrhages, all cured by treatment on general principles.

(2) It is just possible that the patient would not have developed hæmothorax had he suffered from hæmatemesis, a common occurrence in snake-bite poisoning cases.

I am greatly indebted to Dr. J. J. Dunn, M.O., Bahawalnagar, North Western Railway, for his kind consultation and advice.

THE SUCCESSFUL TREATMENT OF "VITILIGO DIFFUSA" BY INJECTIONS OF SODIUM CACODYLATE.

By MOHOMMED ABDUL QUIYUM, L.M.P.,

Medical Officer, District Board, Darbhanga.

A BRAHMIN boy, Paratab Narain, aged 14 years, came to me while I was in charge of the Buchouli dispensary with the complaint that for the last 4 years he had been suffering from progressive generalised distribution of white patches almost all over the surface of the body, but most marked over the trunk and upper extremities. On examination I found that the patches were whitish in appearance, of the size of four anna silver coins, but not symmetrical in any respect. He also complained of constipation since the appearance of the trouble. I enquired from his father as to whether he had ever suffered from any venereal troubles, but he responded with a very definite negative. During the last 4 years of his ailment he had undergone a regular treatment at the hands of the local vaidya and quacks, but none could procure him any benefit. He was the only son of his parents, so they were most anxious about his ill-health and the stubborn advance of the disease. I decided to treat him by

arsenical preparations parenterally, and chose sodium cacodylate for this purpose. I injected him hypodermically with sodium cacodylate solution ($\frac{3}{4}$ grain in 1 c.cm.) on alternate days until 10 injections had been given. On finding a marked improvement in him, I used the solution of higher potency (3 grains in 1 c.cm.) with the same alternation and by the same route. After a course of 24 injections, the symptoms disappeared; the patches vanished completely. Of course I had prescribed him a good combination of medicines for oral administration in association with the injections.

KYPHOSIS AFTER TETANUS.

By M. B. VARDE, L.C.P.S.,
Shirpur (W. Khandesh).

IN May last I met a case of tetanus which was successfully treated, but curiously enough the patient developed kyphosis as a result of tetanus. As this is a rare sequela of tetanus, I wish to bring this case to the notice of the profession with the intention that I may be enlightened on the causes thereof.

I saw at 6 p.m. on 4th May, 1928, S. H., shoemaker's boy, aged 11 years suffering from lock-jaw and stiffness of the neck. Duration of the illness, a week. With great difficulty he could swallow liquids. A small wound was present in the great toe of the left foot. He was given immediately a dose of anti-tetanus serum P. D. and Co. and the following mixture:—

℞	
Chloral Hydras	.. gr. xxx.
Pot. Bromide	.. gr. xxx.
Tr. Digitalis	.. m. xx.
Tr. Hyoscyamus	.. 5 ii.
Spt. Chloroform	.. 5 i.
Aqua.	.. 5 ii.
Ft. mist. 1/3rd part	t. d. s.

The next morning the symptoms had slightly abated. The cost of the serum being prohibitive, the parents of the boy could not afford to spend money for the serum treatment. I therefore gave the patient 20 c.c. of a 25 per cent. sterile mag. sulph. solution 10 c.c. in each flank under the skin once a day for three consecutive days and the above mixture for a week more. The treatment was stopped on the 14th of May as the patient was completely cured. The patient had grown so weak that he was unable to move about.

He had no trouble now, but after a month the patient came to me and showed the deformity he had developed after his last illness of tetanus. On examining I found it was kyphosis. The chief point of interest in this case is that the patient developed kyphosis during convalescence after tetanus.

(It would appear that the original diagnosis of tetanus rests on a somewhat slender basis.—Ed., I.M.G.)

Indian Medical Gazette.

OCTOBER.

THE LEPROSY PROBLEM—A STEP TOWARDS SOLUTION.

"THE Leprosy Problem" is an expression which has become relatively common in the press—medical and lay alike—within recent years. Until comparatively recent times, leprosy was not considered a disease worthy of co-ordinated scientific investigation. Valuable pioneer work by Hansen, Looft and Danielssen in Scandania, by Unna in Germany, by Clegg, Duval and their associates in America and by Rogers and Row in India laid the foundation but the superstructure, in the shape of a world-wide campaign against the disease, was completely wanting. Now all this has been changed: the intensive work of American investigators (backed up by the weight of American public opinion), bids fair to stamp the disease out of the New World while the ever-increasing activities of the British Empire Leprosy Relief Association augur well for the progress of the campaign in those areas of the Old World within the radius of the commonwealth of nations constituting the British Empire.

With the advancement in knowledge; old ideas are rapidly going by the board and in particular the old policy of segregation is being subjected to drastic modifications. So far as India is concerned, a policy of absolute segregation is financially impracticable, even were it justified on medical grounds. The 1921 census gives the total number of lepers in this country as slightly over 1,00,000. Conservative estimates based on recent investigations indicate that there must be at least four to five times that number.

A careful study of the problem in all its aspects has fully demonstrated that the most effective line of attack so far as India is concerned is that of combined propaganda, treatment, and survey. Centres designed primarily for the treatment of early cases are opened by small bands of specially trained workers, operating in different highly endemic areas. At the same time propaganda is carried on among the inhabitants of the district particularly with regard to the necessity for treatment in the earliest stages of the disease, and thirdly, careful enquiry is made into the factor or factors responsible for the disease in any given district. Small preliminary surveys of this nature have already brought to light many facts of considerable importance, not the least of which is the unreliability of the official census figures as an indication of the actual incidence of leprosy in this country.

It is obvious that a scheme of this nature, applied as an All-India measure, cannot be finan-

ced solely from the relatively limited funds allocated to the Indian Council of the British Empire Leprosy Relief Association and that outside assistance is necessary. It is in this connexion that Provincial Governments have, in our opinion, a clear duty to perform.

Certain provinces, recognising the undoubted merits of this new line of attack, have already taken steps to initiate schemes of combined propaganda treatment and survey in their respective areas. These provinces are the exception, however, rather than the rule. In the province of Bengal, for example, in which the incidence of leprosy is a problem of considerable gravity the plans have been on the table for some time but the necessary financial support is lacking. We are advised that a period of 5 years would suffice for a survey of, and the establishment of treatment centres in, the 15 or 20 districts of Bengal in which the incidence of the disease is greatest; moreover it is estimated that the cost would certainly not exceed the relatively trivial sum of Rs. 12,000 per annum.

The ever-increasing facilities for inter-communication and the consequent commingling of the population are undoubtedly leading to a spread of leprosy, and nothing is to be gained by a few spasmodic and isolated attempts at an anti-leprosy campaign. Is it too much to hope that this small but necessary provision will be found in the next year's provincial budgets, so that those provinces and states that have not yet come into line will be able to do so in the immediate future?

CORRIGENDUM.

Aug. Number page 451. "Vaso-motor disturbance after Injection." By "U. Travatham," read "V. Travatham."

SPECIAL ARTICLE.

A NOTE ON WEIL'S DISEASE, OR LEPTOSPIROSIS ICTEROHÆMORRHAGICA.*

By D. A. TURKHUDD, M.B., C.M. (Edin.),

"Ifley," Kodaikanal, S. I.

ON the 21st April, this year (1928), Dr. Beals of Wai, who had just come up to Kodaikanal, wrote to me that she had heard that some children at this hill-station had suffered from fever followed by jaundice, that she had come to know altogether of nine such cases, and that at the time of writing, she had staying in her own house, a little girl who had only just got over an attack of fever and jaundice. I quote from her letter:—"Now the question arises as to the cause of such an epidemic. The four cases I have seen have all been mild. However,

* Read at the Missionary Medical Conference held at Kodaikanal in May 1928.

questions have been raised of its possibly being Weil's Disease.....To me, these cases seem much too mild to be the disease, but I suppose there might be mild epidemics of it as we see in other diseases." I saw the case referred to by Dr. Beals, the following day; her history was as follows:—

D. B., after being miserable for a week began to develop jaundice. The exact dates, however, of the onset of the fever and the appearance of jaundice, could not be ascertained. When I saw her, which was about a fortnight after the commencement of her illness, the girl had no rise of temperature and no jaundice, but there was a good deal of weakness present. The motions were clay-coloured, and there was no abdominal tenderness. The urine was highly bile-stained, specific gravity 1010, but showed no albumen. The centrifuged sediment from specimens of urine obtained on two occasions, showed a few bile-stained renal epithelial cells. No leptospiræ could be detected with Giemsa's stain. Within a few days the girl was quite well again.

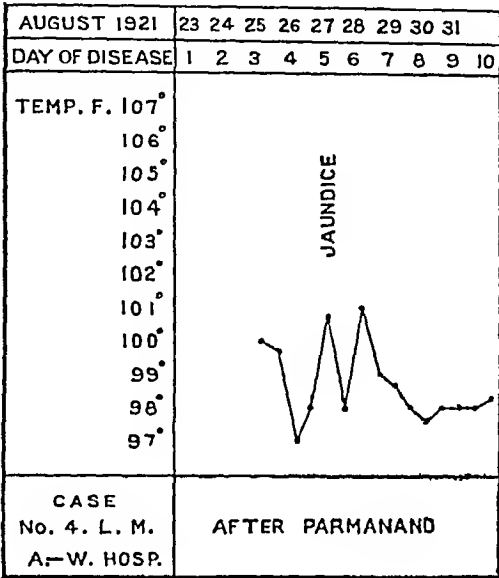
On the 23rd of the same month, I was asked to see another girl:—

C. V. P. Her temperature, when I visited her, was 102°F., and pulse 88, slow in relation to the fever. The conjunctivæ were clear, the liver very slightly enlarged but not tender, no pain anywhere, and no weakness. The next day her temperature was normal. She did not develop any jaundice and was soon all right. The urine showed nothing abnormal except high specific gravity, 1030.

From the examination of these two cases only, it was not possible to come to any definite diagnosis without further observations on similar suspicious cases. On the other hand, it is interesting to note that a similar epidemic of fever followed by mild jaundice was, I understand, noticed here during the season of 1927. And although the present epidemic, from the history of the cases seen by other physicians, the course of the illness, and the clinical signs, is highly suggestive of Weil's disease, the actual demonstration of the causal organism by laboratory methods, still remains to be carried out.

As I had had something to do in connexion with a small epidemic of Weil's disease which was diagnosed in Bombay in the year 1921, I thought that these cases might be of some interest especially as epidemics of fever followed by jaundice have been reported from time to time in this country.

WEIL'S DISEASE



In 1921, a few sporadic cases of fever in which jaundice supervened after the fever had lasted from three to eight days, were reported in Bombay. Dr. M. J. Parmanand, M.B., B.S. (Bom.), who at the time was my assistant in the bacteriological department of the Grant Medical College, and was also working in the Adams-Wylie Hospital in that city, had the opportunity of observing these cases and of watching their progress in the wards of the hospital. His attention was particularly attracted as during the period of only a month and a half he came across no less than seven such cases, three being met with in his private practice. Altogether eleven cases were studied; their chief clinical symptoms are shown in the following table:—

Case.	Jaundice.	Conjunctival congestion.	Vomiting.	Limb-pains.	Hæmoptysis.	Epistaxis.	Albumin-uria.
1. D.N.D.	..	+	+	+	—	—	+
2. N.B.V.	..	+	+	+	—	—	+
3. R.B.C.	..	+	+	+	+	—	+
4. L.M.	..	+	—	+	—	—	+
5. M.S.	..	+	+	+	—	—	+
6. M.H.	..	+	+	+	—	—	+
7. X.	..	+	+	+	—	—	+
8. Y.S.	..	+	+	+	—	—	+
9. B.Y.	..	+	—	+	—	—	+
10. F.A.	..	+	+	+	—	+	+
11. S.K.K.	..	+	+	+	—	—	+

Of these cases, No. 4, L.M., was the most interesting from the diagnostic point of view. This patient was admitted into hospital on the 23rd of August, 1921, with a history of high fever and delirium for three days. On admission the temperature was 100°F., and the liver was enlarged and tender. On the 25th, i.e., the fifth day of illness, slight jaundice appeared. The next day the jaundice was deep, the conjunctivæ became congested, and the temperature rose to 101°F. On the 27th, the conjunctivæ were bloodshot, and there was a purpuric eruption on the upper extremities and on the abdomen, while the temperature had dropped to normal. This combination and sequence of symptoms left scarcely any doubt as to the clinical diagnosis of Weil's disease. The examination of blood smears showed no spirochaetes or any other parasites. The urine was then centrifuged, and smears made from the deposit were stained by Fontana's method. Out of five smears examined, three showed organisms which resembled leptospiræ. As saprophytic spirochaetes not infrequently occur in contaminated urine, catheter specimens were taken from three subsequent cases and similar leptospiræ obtained.

Several epidemics, clinically resembling Weil's disease, have been reported from time to time in this country and also from the Andamans, and have been variously described as "toxic jaundice," "infective jaundice," "camp jaundice," etc.; and Knowles, in his *Introduction to Medical Protozoology*, writes "it is almost certain that Weil's disease occurs in India."

The history of epidemic jaundice dates from the year 1800, when it affected Napoleon's army at the siege of Cairo; and epidemics have since been reported in Europe by several observers. It was in the year 1886, however, that Weil of Heidelberg, described for the first time, the clinical signs and symptoms of the disease which has been since known as Weil's disease. But as the features described by him are those of epidemic catarrhal jaundice, Osler suggests that "it would be an advantage if the designation Weil's disease were dropped."

Until 1914, the exact cause of the disease was unknown; but in that year, Inada and Ido discovered the causal organism and described it in the *Journal of Experimental Medicine* for March, 1916. This pathogenic agent is a spirochæte, and as it resembles the leptospira of yellow fever, *L. icteroides*, it is now called *Leptospira icterohæmorrhagiæ*. According to Noguchi, a leptospira shows minute elementary spirals running throughout the body; there is entire absence of flagella as well as of undulating membrane, and progression is by rotary movement with one end hooked. These organisms differ from other blood spirochætes in that they resist the action of 10 per cent. saponin, but are dissolved by bile-salts.

The leptospiræ of Weil's disease are present in the blood only during the first five days of

fever, and are best detected under dark-ground illumination. After ten days they appear in the urine, being excreted by the kidneys, and may continue to be discharged in this way, sometimes for weeks. They are agglutinated by the patient's blood after the second week. This serological test serves to distinguish the leptospiræ of Weil's disease from other strains and species. *Leptospira hebdomadis*, which causes the so-called seven-day fever of Japan, and *L. icteroides* of yellow fever are not agglutinated by the blood of patients suffering from Weil's disease.

The usual laboratory method of diagnosing Weil's disease, is by injecting about 3 c.cms. of the patient's blood, taken early during the febrile stage, intraperitoneally into a young guinea-pig. If the fever has subsided, the centrifugalised sediment from a specimen of sterile urine obtained by passing a catheter, should be used for intraperitoneal injection. After the death of the inoculated animal, which occurs in about a week, the kidneys should be removed and macerated in a little sterile normal saline, and the emulsion examined under dark-ground illumination, or smears made therefrom and stained by Fontana's method. Coles recommends Giemsa's stain. This leptospira has been cultivated on suitable liquid and semi-solid media, under anaerobic conditions.

The actual method of transmission of the infection in Weil's disease is not yet definitely known. In 1915, Miyajima reported the presence of organisms resembling *L. icterohæmorrhagiæ* in the kidneys of field-mice in Japan. Ido and his colleagues subsequently discovered typical leptospiræ in the kidneys of rats; they, therefore, came to the conclusion that rats played an important part in the transmission of the disease. Inada believed that infection took place through food contaminated with the urinary secretion of rats. Ido and Oki, however, have succeeded in transmitting the disease to animals by the application of the infective material to the unbroken skin; they moreover found that Weil's disease was common among workers in damp, rat-infested coal mines and in swampy fields, the leptospiræ evacuated by rats' kidneys finding a suitable medium for thriving in the damp soil. During the Great War, soldiers became infected in rat-infested damp trenches, and examination of the rats caught in these places, showed the presence of leptospiræ in their kidneys and urine.

In an investigation of an outbreak of the disease in West Lothian, Buchanan (*British Medical Journal*, 1924, II, p. 990), was able to trace the infection to certain coal mines. He showed the presence of *L. icterohæmorrhagiæ* in the slime of the roof, in situations which appeared to be inaccessible to rats. Inoculation of the slime into guinea-pigs produced characteristic symptoms of jaundice, and leptospiræ were recovered from their organs.

Manson-Bahr, Wenyon and Brown have reported in the *Lancet*, 1922, II, p. 1056, a very interesting case of a seaman who fell into the Thames, off Gravesend, and five days later, developed an attack of fever and jaundice. Wenyon and Brown were able to recover leptospiræ from the guinea-pigs inoculated with the blood of this patient.

Typical leptospiræ have been found also in samples of water in various places, and in Europe, epidemics have been traced to several insanitary bathing establishments. Noguchi has found typical leptospiræ in stagnant pools, swamps and ditches. Coles has recorded the presence of free-living leptospiræ in the tap water at Bournemouth, and also in decaying vegetable matter.

In the last proved case of spirochætal jaundice reported from Virginia (*Journal A. M. A.*, 7th April, 1928, p. 1113), although the actual mode of infection could not be ascertained, it is interesting to note that the patient, a boy of 20, was a member of a swimming team. Mulholland and Bray, who have reported this as the eighth case in America, say that Weil's disease is much more common in the United States than has hitherto been suspected.

As regards symptomatology, in the cases under observation in the Bombay epidemic of 1921, the following symptoms were observed:—"In the majority of cases the onset was sudden with a sensation of chilliness, headache, pain in the body, and gastro-intestinal disturbances. The fever was irregularly high, rising to 101° or 102°F., and the pulse slow in proportion to the pyrexia. During this febrile stage, which lasted from four to eight days, acute congestion of the conjunctivæ was a marked feature. Leucocytosis was moderate, about 10,000 leucocytes per c.mm. Jaundice occurred towards the end of the febrile period, and seemed rapidly to become intense, lasting for about eight days. In this stage, although the fever disappeared, the gastro-intestinal disturbances became aggravated, and there was nausea, incessant vomiting and extreme prostration. The pulse became feeble, and there was restlessness and a marked tendency to hæmorrhages. The liver showed enlargement. The symptoms then gradually abated and convalescence began. About the beginning of the third week, however, some cases showed a secondary rise of temperature, which lasted for two or three days, but not accompanied by any of the symptoms which showed themselves during the initial fever.*" The urine in the febrile stage is generally scanty, high coloured and loaded with albumen. In the more severe cases bile pigment is present in abundance. Microscopic examination of the deposit shows casts and blood cells. According to Manson-Bahr, the urine from the 5th to the 8th day, gives an intense green reaction after the addition of 1 or 2 drops of acetic acid.

* (Parmanand, thesis for the M.D. degree).

The mortality of the disease varies from 5 to 6 per cent., as met with in Europe, to about 30 per cent. in Japan. Among the eleven cases seen in Bombay, there was one death.

As regards the morbid anatomy, in the great majority of cases there is congestion and slight enlargement of almost all the organs, and in icteric cases, the pigmentation affects all tissues and organs. The liver is enlarged, and on section shows a moderate degree of focal necrosis. The kidneys are congested and enlarged, and microscopically show, in most cases, degenerative changes in the epithelial cells. Stevenson, who examined Barker's cases from the Andamans, found marked general parenchymatous nephritis, and the sections, when stained by Levaditi's method, showed leptospiræ in the cells and in the lumina of the straight tubules. (Brown, *Lancet*, 25th February, 1928). In a case which died in the Sir Jamsetjee Jeejeebhoy Hospital in Bombay, with suspicious clinical symptoms of Weil's disease, Parmanand found leptospira-like organisms in the blood-stained fluid aspirated from the liver.

The exact diagnosis of leptospiral jaundice can only be made by laboratory methods. Examination of stained blood-films rarely reveals the leptospiræ, as their number is small. Animal inoculation is, therefore, usually resorted to, and as a routine measure, Stokes, Ryle and Tytler recommend intraperitoneal injection of young guinea-pigs with 3 c.cms. of patient's blood within the first seven days of illness. For obtaining positive results in every instance, however, it is advisable to secure about 10 c.cms. of blood, and to inject one-third of the quantity into three separate guinea-pigs.

In the Bombay epidemic the guinea-pig inoculations were inconclusive; and in this connection it is interesting to note that in all of Barker's cases in the Andamans also, animal experiments yielded negative results. The disease that Barker was dealing with has now been proved to be leptospirosis, by the finding of leptospiræ in the kidneys of some of his autopsied cases.

But even without these laboratory methods, the diagnosis of Weil's disease can be arrived at with a certain degree of accuracy by clinical examination.

Barker, in his thesis on "Leptospirosis" for the degree of M. D. of Cambridge, gives the following main diagnostic symptoms of the disease. (*Indian Medical Gazette*, October, 1926):—

Sudden high fever.

Relative tachycardia for temperature.

Severe headache, backache, intense myalgia of the entire body, and great prostration.

Early conjunctival injection.

Jaundice.

Epistaxis and other hæmorrhages, eruption, constipation, nausea and vomiting.

Alluminuria and choluria.

In this connexion, there is also a paper on "Weil's disease in the Andamans" by Deuskar, in the *Indian Medical Gazette* for January, 1928.

In the Bombay epidemic, limb pains, jaundice and albuminuria were present in all the cases under observation. In the Andamans, violent muscular pains, prostration, and conjunctival injection were met with in practically all Deuskar's cases; while jaundice was seen in 14 cases out of 23, and albuminuria in 9 cases only. Stokes, Ryle and Tytler found jaundice in more than 60 per cent. of cases in their investigations in the epidemic in Flanders.

rash, and a saddle-back fever, but no jaundice. In the seven-day fever of Japan, the causative organism is a leptospira, and there is a rash, but no pains, no jaundice, and no mortality. The organism of the relapsing or famine fever of India, is not a leptospira, but a spirochæte, now known as *Borrelia carteri*, which can be very readily made out under the microscope. Finally Weil's disease has to be differentiated from epidemic catarrhal jaundice, in which no organism has been discovered, and which is a local disease limited to the bile-ducts and not a general infection. Moreover, in the latter disease, there is enlargement of the spleen as well as of the liver.

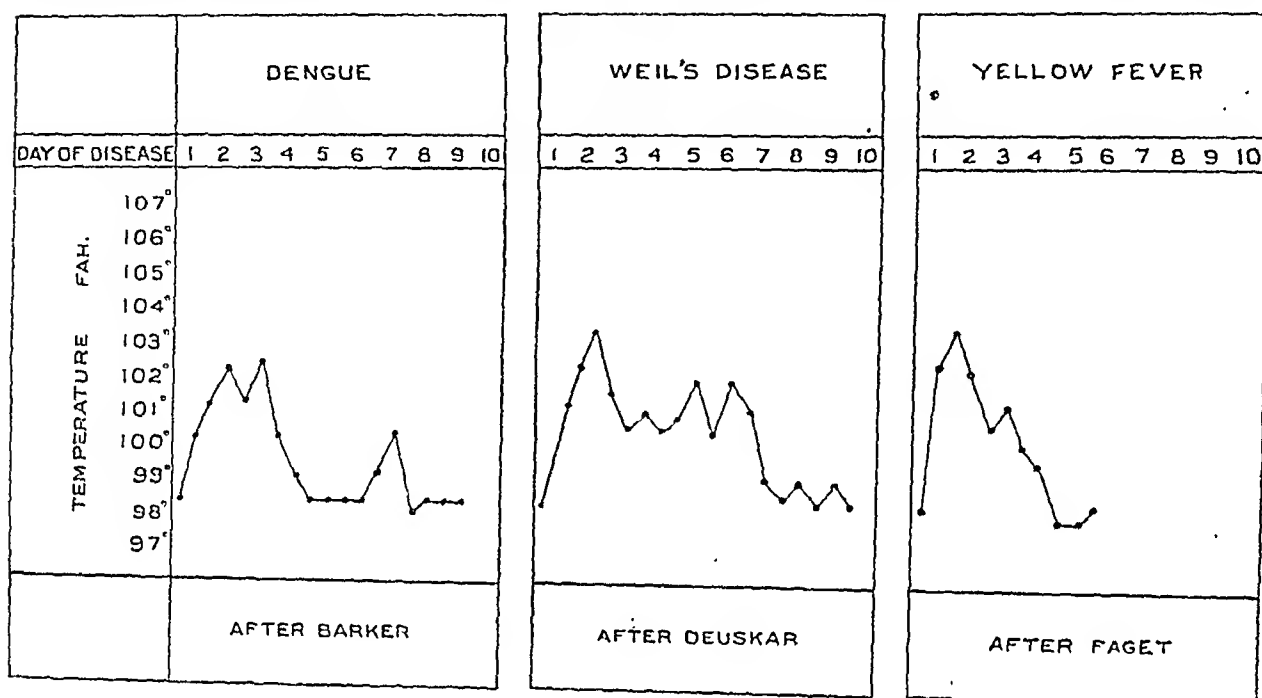


TABLE OF SYMPTOMS.

Symptoms.	Seven-day fever of Japan.	Dengue.	Weil's disease.	Yellow fever.
Albuminuria	—	—	+	+
Jaundice	—	—	+	+
Pains	—	+	+	+
Tachycardia	—	+	+	+
Rash	—	+	+	+
Fever	+	+	+	+
Conjunctival injection	+	+	+	+
Leptospira	+	+	+	+
Reservoir	+	?	+	+
Insect vector	Field mouse	Man?	Water, Slime, Rat, Man?	Man.
Hæmorrhages	? Rare	Mosquito Rare	Direct infection	Mosquito.
Black vomit	Rare	Rare	+	+
Enlarged liver	+	+	In severe cases	+
Enlarged spleen	—	—	+	+
Mortality	Seldom fatal	Seldom fatal	Often fatal	Heavy mortality.

In India, leptospiral jaundice has to be differentiated from certain epidemics. It resembles in every respect, a mild epidemic of yellow fever, but this disease is not supposed to exist in this country. In dengue, there are joint pains, a

Treatment.—Inada and Ido have prepared a polyvalent serum by immunising horses. It has marked protective and curative properties, and is used in the treatment of the disease in Japan. Apart from this, the treatment is symptomatic.

Deuskar tried salicylate injections with large doses of alkalies by the mouth, but his fever charts do not show that this treatment in any way affected the course of the disease. For hæmorrhages, he got no results from calcium chloride and adrenalin. Urotropine has been found useful according to the *Memoranda on Medical Diseases* issued by the War Office in 1919. Grey powder in small doses may be tried, but as albuminuria is present, the effect of these drugs should be carefully watched. Sodium phosphate and ammonium chloride have also been recommended. From the laboratory point of view, it appears to me that as these leptospiræ are dissolved by bile-salts, Weil's disease might be treated with 3 to 5 grains of sodium taurocholate, given internally, two or three times a day.

Before concluding, I should like to draw attention to the accompanying table of symptoms in the seven-day fever of Japan, dengue, Weil's disease and yellow fever. It shows how the same symptoms are common in all these diseases. They all appear in epidemic forms; but the symptoms, which are mild in the seven-day fever of Japan, increase in intensity in dengue and Weil's disease, until they become very severe in yellow fever, in which a high degree of mortality is reached. Manson-Bahr, in his *Tropical Diseases* states that "dengue is probably one of the most difficult diseases to differentiate from yellow fever." The temperature charts are more or less similar. In three of these diseases, viz., the seven-day fever of Japan, Weil's disease and yellow fever, the causative organisms are leptospiræ, morphologically alike, and differing only in certain immunological reactions. May it not be, however, that all these leptospiræ have been derived from the same original stock, only, that the virulence has been greatly diminished in the case of *Leptospira hebdomadis* by a number of passages through certain animals like the field-mouse, while in the case of yellow fever, the virulence is highly exalted by a long series of transmissions through man?—Who knows? In this connection I would like to quote the following from Glen Liston's address at the Medical Research Section of the Indian Science Congress held at Madras in 1922:—"Epidemics of jaundice with a considerable mortality have occurred in India and the Andamans, but no person has yet proved that the leptospiræ found in these epidemics were *icterohæmorrhagica* and not *icteroides*. With these facts before us, I would ask you to consider whether we have, or have not, yellow fever already present in India."

It is interesting to note that Sellards, in his investigations in connexion with the epidemic of yellow fever at Paratyba in Brazil in 1926, has come to the conclusion from his serological experiments, that *L. icterohæmorrhagica* is identical with *L. icteroides*.

And now, as the result of the latest experimental work in West Africa, considerable labora-

tory evidence has been collected in support of the former view that yellow fever is caused by a filterable virus, and not by a leptospira. Adrian Stokes (who fell a victim to it while conducting this research work), with his colleagues Baur and Hudson, made the important discovery that the common *rhesus* monkeys are extremely susceptible to the infection, and that no leptospiræ could be found in their blood, or after post-mortem examinations. (*Journal A. M. A.*, Vol. 90, No. 4, p. 253).

Sellards' observations have also been confirmed, and independent investigators have shown the serological identity of *L. icterohæmorrhagica* with *L. icteroides*; and it appears to be now almost certain that the organism described by Noguchi as the cause of yellow fever, must have been obtained from cases of Weil's disease, or probably from patients with a double infection. Sellards and Hindle have now further discovered that the filterable virus of yellow fever, like that of vaccinia and rabies, is unaffected by cold, and if frozen, will maintain its virulence for at least twelve days, and possibly much longer. (*B. M. J.*, 28th April, 1928, p. 713).

Unfortunately, Noguchi, who had done an immensely valuable work in connexion with spirochaetosis and leptospirosis, has also now fallen a martyr to yellow fever while conducting this important research work in West Africa, and it will be some time before investigators will be in a position to say definitely, whether Weil's disease and yellow fever are different manifestations of the same disease, or totally different entities.

Note.—Since my reading the above paper before the Missionary Medical Conference, two other cases have been brought to my notice by Dr. Wilder and Dr. Manley, and their history, symptoms, and clinical signs leaves no doubt in my mind about the presence of Weil's disease in Kodaikanal.

Current Topics.

Bombay Letter.

THE J. J. Group of Hospitals is situated on an area of land measuring 42 acres. It is a small town by itself and is continually expanding. The total population numbers 2,000 and this includes patients, nurses, doctors, students and the menial staff. The J. J. Group of Hospitals comprise the following:—

Sir J. J. Hospital.

Sir Cowasji Jehangir Ophthalmic Hospital.

Bai Motlibai Lying-in Hospital.

Sir D. M. Petit Hospital for women and children.

The J. J. Hospital was built in the year 1843 and Sir Jamsetji Jeejeebhoy the first baronet, gave the munificent sum of Rs. 1,64,000 towards the cost of building. As hospitals go in India, it is one of the oldest and certainly the largest in the western Presidency. The Sir C. J. Ophthalmic Hospital was

built in the year 1866 for diseases of the eye as an adjunct to the J. J. Hospital. Owing to the great demand for more beds, the hospital was extended in the year 1909, and a new block was erected by the donor's son, the present Sir Cowasji Jehangir, *Bart.* The total number of beds at present is 73. The present baronet has generously offered a donation of Rs. 1,50,000 and the building being too old for modern requirements is to be pulled down and a modern, up-to-date eye hospital will be built in the course of the next two years, the expenses being jointly defrayed by Sir Cowasji Jehangir, *Bart.* and the Government. The Bai Motlibai Lying-in Hospital and the Sir D. M. Petit Hospital for women and children were opened to the public in March, 1892. The total number of beds in both these hospitals is 80: 40 in each.

Ever since the present Governor of Bombay set his foot on the soil of this country he has espoused the cause of suffering humanity. In a speech which he delivered in reply to an address of welcome given to him by the Municipal Corporation of Bombay, he pointed out that the ratio of beds to the population of this city was woefully inadequate. He started a Hospital fund known after him, and—thanks to the untiring efforts of himself and a band of devoted workers—a handsome sum of Rs. 13 lakhs has been collected towards it. Sir Byramjee Jeejeebhoy came forward with an offer of Rs. 2 lakhs to build a hospital for children; the building is nearly complete and will be formally opened before His Excellency leaves India. There has always been a keen rivalry as to which is the premier city of India—Calcutta or Bombay. It is a matter of pride to Bombaites that this is the first city in India to own a separate hospital for children and Bombay has set a fine example which Calcutta is sure to follow.

A sum of Rs. 4 lakhs was handed over to His Excellency the Governor by the trustees of the late Rao Bahadur Ellappa Balam, and a handsome pavilion of three storeys bearing the name of the Rao Bahadur has been erected and will be declared open early next year. Accommodation for 104 additional patients has been provided in this hospital, which in compliance with the wishes of the trustees will be reserved for Hindus only. It is also proposed to build another pavilion of about 100 beds in which accommodation will be provided for venereal diseases, skin diseases, and a special ward set apart for diseases of the ear, nose and throat. A special up-to-date theatre is to be built for the specialist in Otolaryngology and Rhinology. It may safely be said, that Bombay again is in the van of the other cities of India in providing beds for the special branches of Medicine and Surgery.

Thanks to the generosity of the Trustees of the Sir Currimbhoy Ebrahim Memorial Fund, a sum of Rs. 1 lakh was handed over to the Sir Leslie Wilson Hospital Fund to build a dental college and hospital on the spacious terrace of the out-patient department. Twenty-seven dental chairs will be provided in this hospital and it is proposed to put students through a course of four years in dental mechanics and dentistry, and the University of Bombay has been asked to grant a degree in dentistry. Even at the risk of wearying the readers of this article, the writer cannot forbear to observe that Bombay, whose civic coat of arms bears the words "*urbs prima in Indis*," will be the first city in India to train her own dentists.

As the number of beds has increased, additional accommodation is to be provided for the extra nurses that will be required. A block for 99 nurses is being built as an annexe to the Wadia Home for nurses which is a model of its kind and one of the best homes for nurses in India.

A central clinical laboratory under the charge of an expert clinical pathologist will be located in the Out-patient Department. It is proposed to spend a sum of Rs. 10,000 in equipping this laboratory. The clinical pathologist will work under the Professor of Pathology and will thus be a *liaison* officer between the clinician and the Professor of Morbid Anatomy.

Grant Medical College, Bombay, 1923–1928.

By S. L. BHATIA, M.C., M.A., M.D. (Cantab.),
M.R.C.P. (Lond.),
CAPTAIN, I.M.S.,

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DURING the quinquennium 1923-28, some changes of a far-reaching character have taken place in the college, which promise to increase the efficiency and usefulness of the institution. The more important changes consist in increased facilities for practical instruction in Midwifery, Medicine and Surgery, expansion of Sir J. J. Group of Hospitals, revision of the medical curriculum, reorganisation and expansion of the Pathology Department, establishment of Sir Currimbhoy Ibrahim Memorial Dental College and Hospital, and the introduction of the system of staffing the hospital by officers working in an honorary capacity. Most of these developments have taken place during the régime of His Excellency Sir Leslie Orme Wilson, P.C., C.C.I.E., C.M.G., D.S.O., Governor of Bombay, who from the very day he took over the administration of this Presidency has shown most lively interest in the subjects of medical relief and medical education. It might be of interest to consider these changes in some detail.

1. Increased facilities for practical instruction in Midwifery.

When Sir Norman Walker visited Bombay in 1921, on behalf of the General Medical Council of Great Britain, the chief drawback noticed in the system of training here was the lack of suitable facilities for practical instruction in midwifery. Since then marked progress has taken place. The main hospital for the teaching of this subject is the Bai Motlibai Hospital. In 1922-23 we utilized, in addition, the Cama and Ablesse Hospitals for midwifery training of our women students. The Bombay Corporation came forward to help us and allowed our men students to be trained at the Corporation Lying-in Dispensaries.

In addition to this, the Newrosji Wadia Maternity Hospital, which was founded on 9th June, 1925, in Parel has been of great assistance to us. This hospital is the result of co-operation between Sir Ness Wadia, the donor, the Government and the Municipality, and in the words of Sir Norman Walker "can challenge comparison with any in the world."

During 1927, arrangements were made with this hospital for the training of our students in practical midwifery. The students attend this hospital in batches of two at a time, and the arrangements have proved satisfactory.

Owing to the increased facilities detailed above, the students are now able to complete the requisite number of midwifery cases in a reasonably short time, and there is no difficulty now in fulfilling all the requirements of the General Medical Council of Great Britain so far as this subject is concerned.

2. Increased facilities for Clinical instruction in Medicine and Surgery and expansion of Sir J. J. Group of Hospitals.

In the years immediately after the War, there was a great rush of students to the college. It was part of a phenomenon common in other countries also, e.g., Great Britain. The increased number was readily accommodated in the Departments of Anatomy, Physiology and Pathology, but there was considerable difficulty as regards clinical instruction in the wards. The ratio of beds per student became too small for efficient training. The congestion in the wards was felt keenly by the clinical teachers. The position was fully realised by the College and University authorities. To remedy this to a certain extent, the Gokuldas Tejpal Hospital was utilized as a teaching centre for students in medicine and surgery in 1924. We still send students there for clinical instruction and the arrangements have worked satisfactorily. At the same time, the number of admissions was limited to 120 per year in 1924, and since then, there has been a steady reduction.

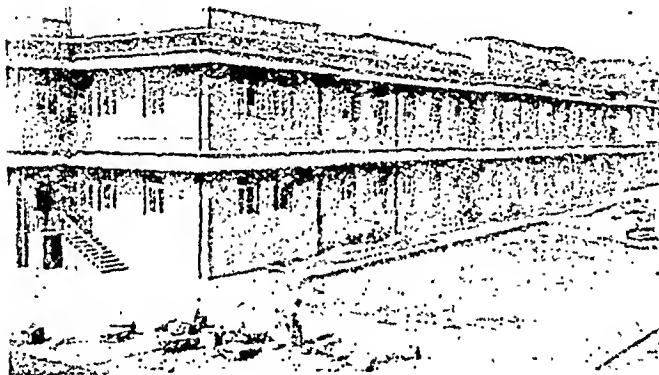
The most important measures for providing increased facilities for clinical instruction, however, consist in the additional ward accommodation provided in the expansion scheme of Sir J. J. Group of Hospitals. In this connection, the Sir Leslie Wilson Hospital Fund has played an active part. The Yellappa Balaram Pavilion of 104 beds is now under construction. Another pavilion of 97 beds is soon to be erected. The Byramjee Jeejeebhoy Hospital for children of 100 beds is well on its way to completion. The foundation stone for new nurses' quarters for 99 additional nurses, which will be required for this extension, has already been laid by His Excellency Sir Leslie Wilson on 28th February, 1928, and the buildings are now under construction.

The total number of additional beds after the two pavilions and the Byramjee Jeejeebhoy Hospital for children are ready, will be 301. Counting the present number of 326 beds, the total accommodation in the J. J. Hospital will be 627.

Apart from this there is a scheme to add 27 more beds to the Sir Cowasjee Jehangir Ophthalmic Hospital. Expansion of Gokuldas Tejpal Hospital is also taking place.

4. Reorganisation and expansion of the Pathology Department.

For some time past we had felt the necessity of reorganising the Pathology Department. The Departments of Pathology and Bacteriology were isolated and housed in separate buildings at some distance from each other. The Pathology Museum was comparatively small and was located in the main college building away from both the Pathology and Bacteriology Departments. Besides, there were no facilities for research work. To remedy these defects, it was suggested in 1925 by Dr. V. R. Khanolkar, M.D. (Lond.), the then Professor of Pathology, that the two Departments of Pathology and Bacteriology be amalgamated with one head for the whole department. It was thought that the addition of a floor to the existing Pathology building would provide sufficient extra accommodation but the late Mr. Wittet, Consulting Architect to the Government suggested that it was more economical and convenient to consider an independent structure rather than a scheme of alteration and addition to the existing building. This suggestion was accepted. New plans were prepared by the late Mr. Wittet for an



The Byramjee Jeejeebhoy Hospital for Children.

3. Revision of the Medical Curriculum.

In 1923, the University of Bombay introduced new regulations for the M.B., B.S., degrees, the most important effects of which were that:—

- (a) The period of hospital training for undergraduates was raised from two to three years.
- (b) The standard of preliminary education required for admission to the college was raised from the Previous to the Intermediate Science Examination. (Group comprising Biology, Chemistry and Physics).
- (c) The standard for pass was raised in all the subjects.

Certain consequential changes took place in the college. Formerly when students were admitted after the Previous Examination, the first year of their training in the Medical College was devoted to the study of Biology, Chemistry and Physics, which were taught here. This comprised the Preliminary Scientific Examination. But after the introduction of the New Regulations, the training in these subjects was imparted solely by the Arts College, and there was, therefore, no necessity to maintain these departments here. The Department of Biology, which was housed in the Bacteriology building, was closed down, and the whole building was thus taken over by the Bacteriology Department. The Departments of Physics and Chemistry were still maintained, as the New Regulations provided instruction in Applied Physics and Applied Chemistry in the Medical Curriculum.

independent building which consisted of a total area of 25,814 square feet. There was, however, considerable pecuniary difficulty in carrying out the project. Dr. R. Row, M.D., D.Sc. (Lond.), who was appointed Professor of Pathology in 1926 approached Sir Dorab J. Tata, who showed his practical interest and sympathy in the scheme by offering a generous donation of about Rs. 2 lakhs towards its expenses. One of the conditions on which this offer was made was "that the building are to be commenced as soon as the financial exigencies of Government permit, but the buildings should be completed within a year and a half from date." This offer was accepted by Government, but it was agreed subsequently, that the period of one year and a half for the completion of the building should run from the date of the sanction of Legislative Council, from which date also the date of sanction of Government to the project will take effect. The Bombay Legislative Council gave its sanction on 28th July, 1927, with the proviso that a Committee consisting of official and non-official medical men should consider all the plans and estimates. This Committee was appointed.

This Committee met on 19th October, 1927, and carefully considered all the plans and estimates and suggested certain alterations, which were unanimously agreed upon. We have also had the benefit of the advice of Dr. Heiser and Dr. Carter of the Rockefeller Foundation and of certain experts in this branch at the Pasteur Institute, Paris. Administrative approval was accorded to the construction of the new laboratories at

an estimated cost of Rs. 3,92,972, half of which was to be made from the donation of Sir Dorab Tata, and the other half by the Government. The work of construction commenced on 11th January, 1928, and is progressing rapidly. The new building will house the Pathological Museum, the Bacteriological and Clinical Laboratories, and will have ample accommodation for post-graduate instruction and research work. This scheme also includes provision for an up-to-date refrigerator and mortuary and an animal house. We look forward to having a very fine and up-to-date institute in the grounds of the College by the middle of next year. Much credit for this is due to the enthusiasm of Dr. R. Row.

5. *The Establishment of Sir Currimbhoy Ibrahim Memorial Dental College and Hospital.*

A sum of Rs. 91,000 collected for the perpetuation of the late Sir Currimbhoy Ibrahim's memory was handed over at the suggestion of His Excellency Sir Leslie Wilson by the Memorial Committee to the Sir Leslie Wilson Hospital Fund for the purpose of establishing a Dental College and Hospital for the poor to be named after the late philanthropist. To this, an extra sum of Rs. 9,000 was added by the Trustees of the late Sir Currimbhoy Ibrahim Knighthood Memorial Fund, so that a round sum of Rs. 1 lakh was given by the donors. To this, the Government contributed an equal sum. The suggestion of a Dental College and Hospital appealed to all the parties concerned. Dr. J. J. Modi, Professor of Dental Surgery in the Grant Medical College, had on previous occasions urged the necessity of such an institution in the city. The Memorial Tablet of the hospital was unveiled by His Excellency Sir Leslie Wilson on 28th February, 1928. It will be built on the first floor terrace of the new out-patient department of Sir J. J. Hospital and will be the first institution of its kind not only in Bombay but in India.

In the Dental College, it is proposed to give instruction for qualification in dental surgery which will rank equally with the registrable dental qualifications in the United Kingdom.

6. *Introduction of the system of staffing the Hospitals with Medical men working in an honorary capacity.*

One important development in the system of staffing the institution has been the appointment in increasing numbers of highly qualified medical men, belonging to the independent medical profession in the allied hospitals, who work in an honorary capacity. The system was introduced in 1923-24, and has worked satisfactorily.

There are at present six physicians, including one Professor of Medicine (who is an I.M.S. officer and is also Superintendent, Sir J. J. Hospital) one Professor of Materia Medica (who is also Physician to Sir J. J. Hospital), one Associate Professor of Medicine, and three Honorary Physicians. On the surgical side, there are five officers, including one Professor of Surgery, one Professor of Operative Surgery, one Associate Professor of Surgery, and two Honorary Surgeons. In Midwifery and Gynaecology there are two officers, including one Professor of Midwifery and Gynaecology (who is an I.M.S. officer and in charge of Bai Motlibai and Petit Hospitals), and one Associate Professor of Midwifery. A lady doctor is also on the staff of the Dwarakadas Lalloobhoy Dispensary at Bai Motlibai Hospital, where she is in charge of a separate Antenatal Clinic.

In addition to the changes enumerated above, I may also mention the following:—

An up-to-date Embryological Laboratory was opened in 1926. It is well equipped and in full working order as part of the Anatomy Department. Formerly, the teaching in Human Anatomy was mainly topographical, but since the new University Regulations came into force in 1923, Embryology forms an important part of this subject.

The subjects of physiology and hygiene were formerly taught by one professor. In 1926, this system was abolished. A new Professorship of Hygiene was created, so that now the two subjects are taught by two different teachers. This was a very desirable piece of reform.

In 1926, arrangements were made for clinical instruction in mental diseases at the Mental Hospital, Thana, and the medical officer in charge of that hospital was made ex-officio Professor of Mental Diseases in the College.

Apart from the excellent ward laboratories now existing, a well equipped central clinical laboratory is being provided in the J. J. Hospital, under the charge of a clinical pathologist.

The Military Medical Pupils' Class has been abolished in the college since 1923.

The college library has been reorganised and is being extended.

The portrait gallery in the main college building has been brought up-to-date and we now have the portraits of all the principals who were in charge of the college, commencing from Dr. Charles Morehead, the first Principal in 1845.

TABLE I.

Showing the in-patient (bed) accommodation at the J. J. Hospital, Bombay.

Year.	Beds Medical.	Beds Surgical.	Beds Diseases of Children.	Beds Venereal.	Beds Ear, Nose and Throat.	Beds Orthopaedics.	Beds Tuberculosis.	Beds other special departments.	Total.	REMARKS.
1920	160	136	..	..	..	..	..	..	296	
1924	172	136	..	..	..	..	12	..	320	
1928	156	152	..	6	..	..	12	..	326	
Subsequently up to 1930 (additional.)	68	52	100 (50 MdI. 50 Sugl.)	19	26	10	..	26 Skin	301	Total 326 + 301 = 627.

TABLE II.

Showing the in-patient (bed) accommodation at the Bai Mollibai and Petit Hospitals, Bombay.

Year.	Beds Gynaecological.	Beds Maternity.	Beds for Children.	Total.	REMARKS.
1920 ..	20	40	20	80	On transfer of the Children from the Petit Hospital to Byramjee Jeejeebhoy Children's Hospital, when it will be opened in the beginning of 1928-29, their bed accommodation will be occupied by women.
1924 ..	20	40	20	80	
1928 ..	20	40	20	80	
Subsequently up to 1930.	40	40	..	80	

TABLE IV.

Showing the in-patient (bed) accommodation at the Gokuldas Tejpal Hospital, Bombay.

Year.	Beds Medical.	Beds Surgical.	Beds Diseases of Children.	Beds Venereal.	Beds Ear, Nose and Throat.	Beds Orthopaedic.	Beds Tuberculosis.	Beds for Eyes.	Beds other special departments.	Total.	REMARKS.
1920	74	40	6	120	Total accommodation is for 254, Beds actually in use at present 180.
1924	74	40	6	..	..	..	..	..	..	120
1928	87	83	6	No spl. beds.	4	No spl. allotment, included in the Surgical.	..	..	..	180

TABLE III.

Showing the in-patient (bed) accommodation at Sir C. J. Ophthalmic Hospital, Bombay.

Year.	Beds for Ophthalmology.	Total.	REMARKS.
1920 ..	73	73	
1924 ..	73	73	
1928 ..	73	73	
Subsequently up to 1920.	100	100	

Dieting the Corpulent.

By W. F. CHRISTIE, M.D.

The Practitioner, May, 1928 p. 306.

ADIPOSITY of simple or exogenous origin takes years to develop, an increase in weight of a pound a month being an average rate of progress. Since fat comes from food, the plump person need only diet to stop it—the sooner the better. The modern craze for a slender figure, however much we may disapprove of its adoption by normally proportioned people, is a sound hygienic measure for the fat.

The effect of carrying a burden of dead weight, upstairs and down, wherever we go, is seen by each branch of the profession. The physician condemns the strain which is thrown on the heart and circulation, the liability to lung affection, the development of diabetes; the surgeon finds difficulty in obtaining access to anatomical structures and is disturbed by the frequency of herniæ, gall-stones, pancreatitis and ptosis in fat people; the orthopaedist finds the bones, joints, ligaments and muscles strained and painful; the gynaecologist and others see cases daily in which the symptoms are purely referable to the obese state. There seems every reason

to applaud, therefore, the stout woman who wishes to reduce her form, even although her primary motive should happen to be the improvement of her looks, or merely a desire to wear ready-made clothes.

The onus of correcting over-weight in the general public falls naturally upon the family practitioner. To him, more than to any other, is addressed the question: "What is the surest, quickest and safest way of losing weight?" The answer must be: "Through dieting alone can the fat man lose his burden, though systems of exercise, Bergonie chairs, baths, spas, pills and potions may assist the process." Now diets, like dress clothes, need to be fitted to the owner.

The wise dietitian will consult his patient's wishes and constitution before embarking on any particular method. No one would, of course, attempt to reduce in weight those who are suffering from a wasting disease, such as tuberculosis, diabetes or cancer. The mentally weak, the melancholic or the markedly neurasthenic are not, as a rule, suitable subjects for a reducing curc. If it is clear that the patient will be happier, healthier and fitter at a lighter weight, that person ought to be reduced.

By a rapid reduction diet we mean one which is capable of causing a greater loss of fat than two or three pounds a week. Slow reduction diets aim at producing a loss of one to two pounds a week over a long period. Each type has its merits and demerits which are instructive to review.

Diets which Reduce Rapidly.

Because fat is laid down very slowly, its rapid removal must be unphysiological. Wrinkling and bagginess of the skin is apt to occur as the tide of fat subsides, while some muscular and cardiac weakness is inevitable. The devotee of speed in the game of losing weight neither looks so well nor feels so fit as the man who takes it off more slowly; of equal importance perhaps is the fact that he learns very little of the fat-forming qualities of the various articles of food, and is just as likely as formerly to put on weight after he has lost it.

Long Fasts.—The disappearance of ten to twelve ounces of fat per day can be accomplished by a person of moderate activity if he eats nothing at all; a week's total abstinence from food, therefore, reduces the weight by five to six pounds. If the water intake is also limited, which it never should be, the weight falls more rapidly, but the difference is regained within a few days after the return to a normal diet.

Absolute fasts from food of not more than seven days' duration appear in practice to be safe enough for healthy people, although acidosis from the incomplete oxidation of fat usually appears on the third day.

For the purpose of fat reduction, total abstinence from protein food is quite unnecessary, and is not without danger to the unfit; for instance, a lady weighing 17 stones, who had suffered occasionally from auricular fibrillation, had a threatened attack of cardiac failure at the end of a four-day fast, due doubtless to muscular weakness.

Since the loss of permanent weight after seven days' fasting is only five or six pounds, some dietitians recommend a fourteen days *partial* fast. During the first week, the patient is confined to bed on a diet of water, albumen water, clear soup, weak tea with milk but no sugar, and orange juice; while from the third day a limited supply of protein is added.

During the second week, the patient is allowed up, although not fit for much exertion. Headache, nausea and dizziness are indications of acidosis which necessitate a sudden stop being put to the course. In this way, some nine or ten pounds of fat can be lost in return for an even more heroic effort than the first.

Short Fasts.—Commencing with a dose of calomel or a blue pill at night, followed by a Seidlitz powder in the morning, no solid food is allowed for three days, but water is taken *ad lib.*; thereafter, one of two procedures may be adopted:

(a) After a few days on a diet which gets rid of the acidosis, a second fast is instituted, which is again stopped on detection of acetone bodies; by alternate fasting and dieting, in accordance with the state of the urine, it will be found that the body acquires the power, in an increasing degree, of oxidizing the products of breaking down fat, with the result that each successive fast can be lengthened.

(b) The patient may be weaned on to a slow reduction diet. True, very little fat can be lost in three days, but the rest given to the organs of digestion promotes a sense of well-being which many stout people have not experienced for years.

Semi-starvation.—Ready-made semi-starvation diets rise and wane perennially. The "milk and potato cure" has an approximate caloric value of about 750, being two-thirds less than the maintenance diet of an average woman; because it contains vitamins A, B and C, it is thought to be healthier than others.

The period of dieting lasts 21 days, is said to be best adapted for use during the summer months, and a loss of eight to ten pounds in weight is expected. It is carried out on the following lines:—

On waking.—The juice of three oranges and one lemon.

Breakfast.—A cup of tea without sugar or milk, but with a slice of lemon if desired.

Two or three slices of thin brown bread.

Lunch.—Three small baked potatoes or one large one, into which place a pat of butter and add salt. One tall glass of cold, fresh milk.

Tea.—One to three cups of plain tea, as before.

Dinner.—Potatoes and milk, as at lunch.

For the week following the course, food must be recommenced gradually—eggs, spinach, chicken, etc., and so to a normal diet.

Other examples of the rapid method might be cited. For those who are in a hurry to become thin, who are sound in body and strong in purpose, who have less than a stone of surplus fat to unburden, the rapid method has its appeal. It must be carried out under close medical supervision, which, owing to the unfailing disapproval of the patient's relatives and friends, is best done outside the home.

Diets which Reduce Slowly.

The corpulent as a class love their meals, although they will often tell you that "really" they "eat nothing at all." The merits of fasting, however brilliant the advocate, are rarely appreciated, for the nightmare of hunger lurks ever in its background.

A slowly-reducing diet gives quite enough to eat, especially if food is thoroughly masticated. Moreover, it is safe; those who follow it feel unusually fit throughout the period of dieting. Its effects, too, are likely to be permanent; because a considerable latitude in the choice of food is permitted, the reducer takes an interest in and learns to avoid those items which are particularly fat-forming. Very seldom do weights go up afterwards.

A loss of one to two pounds of fat per week is aimed at. If this is maintained over a sufficiently long period, it will be obvious that any amount can be dissipated. In practice, one advises the patient to return for a month to a maintenance diet after the loss of 18 lb.; thereafter, the reducing diet is resumed.

For those who possess a working knowledge of food values, the construction of a scheme for each fat patient is an easy matter. The diet should contain a full ration of proteins, vitamins, mineral salts, roughage and water, but the fats and carbohydrates are reduced a thousand or more calories below the maintenance standard of the individual.

Instead of cream, butter, oil, cheese, animal fats, yolk of egg, sugar, articles made with flour, etc., the holes and corners of an empty stomach are filled with fresh fruits, green vegetables, fresh salads, clear soups, bovril and other items of low caloric content. The diet must not only be balanced and the calories counted, but the menus should be suited to the patient so that he may find them attractive as well as efficient.

The art of writing a dietetic prescription for diabetes, a mere penalty of obesity, is taught in the medical schools, while the primary ailment is apt to receive little attention. Ready-made diets for the reduction of corpulence are, therefore, given to all types of people living under various conditions; like garments off-the-peg, some suit while others do not.

This difficulty can be overcome to some extent by the use of a "skeleton diet," to which may be added as occasion demands one or more items from a graded list of food-stuffs. The skeleton contains most of those elements which are essential for the maintenance of health and the repair of tissue, but its fuel value is greatly curtailed; if, while living on it, the body burns more of its own fat than two pounds a week, the diet should be augmented from the supplementary list, one item at a time.

A skeleton diet (value about 1,200 calories). High protein, low carbohydrate and fat content. $\frac{1}{4}$ lb. bread, 1 oz. butter, 4 oz. milk is the total quantity of these articles permitted during the day.

On rising.—A tumblerful of hot water.

8 a.m.—Half a grape fruit; a breakfastcupful of tea or coffee with milk, but no sugar (use saccharine if necessary); one egg, or a small grilled kidney, or fish as at lunch; toast one thin slice; butter, a scrape.

11 a.m.—A tumblerful of cold water, or a cup of hot bovril; lemon squash made without sugar, or barley water.

Lunch.—Fish: an average helping of any white fish; boiled, baked or grilled; cod, sole, haddock, plaice, whiting, perch, skate, flounders, bass, smelts, halibut, half a lobster. Bread, wholemeal or standard, one slice. Butter, $\frac{1}{2}$ oz., or two small balls. Fruit—eat it raw; choose one of the following: an apple of average size; a teacupful of raspberries, blackberries, cherries or mulberries; a large banana; two average-sized peaches; one orange; two slices of pineapple; a small bunch of grapes; an average-sized pear.

4 p.m.—Tea, as before; toast, one thin slice dry.

Dinner.—Oysters, six (if desired). Clear soup—beef-tea, strained chicken or mutton broth. Meat—cut off all the fat and eat the lean. Must be grilled, boiled, or occasionally roasted. No rich gravy or thick

saucers are allowed, but clear gravy, mint sauce, horse-radish, ketchup may be taken; an average helping of sweetbreads, kidneys, tripe, brains, veal, beef, mutton chops, lamb cutlets, chicken, grouse, partridge, pheasant, pigeon, quail or turkey; the pork butcher's products, including ham, bacon and sausages, are forbidden. Vegetables—two kinds should be available. Take a large helping of cauliflower, cabbage, brussels sprouts, leeks, spinach, mushrooms, tomatoes; but avoid those which grow in pods or underground. A fresh salad of lettuce, cucumber, radish, tomato, made with vinegar, pepper, mustard and a little salt (no oil or egg). Bread, wholemeal or standard, one slice. Fruit, as before. Coffee—black, without sugar.

On retiring.—A tumblerful of hot water, with a little fresh lemon juice added.

Supplementary List of Foods.

The following have much the same fuel value, viz., between 70 and 80 calories:—

Eggs, one.
Butter, one ball (1½ oz.).
Bread, wholemeal, 1 slice (1 oz.).
Bread, white, ½ slice (1 oz.).
Sugar, 4 small lumps (2½ oz.).
One glass of skimmed milk.
Half a glass of fresh milk.
Half a lobster (3 oz.).
Fish, white (4 oz.).
Potato, one medium, boiled (3 oz.).
Peas, green, average help (3 oz.).
Beans, broad, average help (3 oz.).
Jam, 1 oz.

The Treatment of Nausea and certain related Circulatory Sensations.

By ROBERT W. KEETON, M.D.

and

ESTHER S. NELSON, M.D.

(*Jour. Amer. Med. Assn.* March 3, 1928, p. 683.)

In this paper, the authors discuss the control of nausea and certain closely related sensations. These sensations are variously described by patients as dizziness, lightness of the head, pressure in the head and neck, mental numbness and headache. They often appear associated with nausea, but frequently exist independently. In fact, an observing patient, even when questioned carefully, may be unable to relate such sensations to nausea.

The direct relationship to vomiting, however, has been shown. In a previous study, vomiting was divided into two stages, one of regurgitation in which the bowel contents are returned to the stomach, and a second one, of emesis, in which the stomach is emptied. These stages are separate and distinct. Each develops its sensory and motor pattern, and each may exist with or without the other. Further evidence of the participation of the duodenum and intestines in vomiting has been presented recently by others.

Nausea was considered a sensation resulting from abnormal duodenal motor activity, most probably duodenal antiperistalsis. The related sensations were considered phenomena secondary to the duodenal antiperistalsis, and were conditioned on the reflex spread of the stimuli into the cardiovascular fields. They were regarded, therefore, as of circulatory origin, but no attempt was made to analyze the mechanism further. It is well established that duodenal regurgitation of chyme occurs normally and is considered by some authors important in reducing the gastric acidity of the interdigestive phase. When such a normal process exceeds a certain degree of vigour, it becomes pathologic. If, however, the receptive field is hypersensitive, then an antiperistaltic wave of normal vigour may function as a pathologic one and produce the sensation of nausea. If, on the other hand, the circulatory mechanism is abnormally unstable, as in the cases of

so-called vasomotor instability (hyperthyroidism, menopause, dysmenorrhea, migraine and similar conditions) then a given antiperistaltic wave may induce circulatory sensations and the patient will complain of dizziness or other related sensations. From such reasoning it can be seen that a patient may experience, without nausea, any one of the related sensations.

In treating nausea and the related circulatory sensations (dizziness, lightness of head, pressure in the head and neck, mental numbness, frank headache), duodenal dysfunction (antiperistalsis) must be reduced quantitatively or changed into peristalsis.

To accomplish this, the reflexes involved must first be disorganized or separated from their central connections. Then a mild cathartic will re-establish peristalsis.

For this purpose they advocate the use of the bromide ion, and suggest the administration of a powder consisting of 15 grains each of sodium bromide, sodium bicarbonate and sodium phosphate.

Parathyroid Therapy.

(*From the Prescriber*, May, 1928, p. 165.)

THE work of Collip has placed parathyroid therapy on a rational basis, with the result that the literature now presents reports which add to the knowledge of the action of the parathyroid hormone. The effect of parathyroid hormone (Collip's extract) on the calcium balance has been studied by Hoag and co-workers (New York). Seven infants were observed: one normal, four rachitic, and two with infantile tetany. One normal infant and three of the rachitic infants showed distinct diminution of calcium retention while the extract was administered. One rachitic infant gave no evidence of either calcium removal or calcium deposition in the radius and ulna. Two patients with infantile tetany showed a slight tendency towards retention of calcium during the periods of parathyroid treatment. One rachitic patient with striking signs of disturbed calcium metabolism showed noticeable increase in retention of calcium. In these cases, the concentration of the serum-calcium was initially low and was not markedly raised by the extract, never reaching normal levels.

Tetany.—Leitch (Edmonton, Alberta) reports on the use of parathyroid hormone in eight cases of infantile tetany. The hormone was given subcutaneously at daily intervals. Four injections as a rule sufficed to cause cessation of symptoms, although the serum-calcium had not quite reached normal by that time.

Noehren (Buffalo) reports the case of a nurse who developed parathyroid tetany after an operation for thyroidectomy. Collip's parathyroid hormone was given hypodermically starting with 1 c.c. daily for a few days, then 0.5 c.c. daily. The symptoms rapidly disappeared. No record was taken of the blood-calcium content during her illness, but after the symptoms had gone this stood at 7.2 mg. per 100 c.c.—still somewhat below normal.

Hjort and Eder report on a case of adult tetany following thyroidectomy (strumipriva tetany) in which parathyroid hormone alone, up to 130 units daily, had practically no effect on the condition until the treatment was supplemented by oral thyroid therapy. Incidentally they remark that large doses (3 gm. daily) of desiccated parathyroid substance failed to influence the serum-calcium, even when thyroid was administered in conjunction with it.

Oedema.—Several cases have been recorded in which oedema disappeared under treatment with parathyroid hormone (*see Davidson: Prescriber*, 1926 May, 191; Mason: *ibid.*, 1927, May, 183). McCann (Rochester, U.S.A.) now reports its use in three cases of generalized oedema associated with severe disturbance of renal function. In all three the total serum-protein was rather low. The first case was apparently one of acute nephritis with no evidence of hypocalcemia. A very small dose (10 units or 0.5 c.c.) of parathyroid hormone initiated a diuresis which continued until the oedema was almost entirely gone and

persisted long after the transient elevation of the blood-calcium. The second and third patient had generalized oedema with hypocalcemia, but no evidences of tetany. In each of these cases diuresis was initiated by parathyroid hormone, and lasted for several days after a transient increase in the blood-calcium. McCann offers no explanation of this action, which does not appear to take place in non-oedematous subjects, and suggests that the question should receive further study.

Epilepsy.—Madsen is of opinion, as the result of treatment of five cases, that parathyroid hormone has a regulating effect on the ammonia metabolism of epileptics; in some cases, it is necessary to combine the treatment with calcium therapy. Calcium alone is not capable of producing this effect. Improvement in the patient's clinical condition was so noticeable that the benefits can hardly be ascribed to accident. In three of the five cases there was marked reduction in the number of attacks as well as improvement in the physical condition. These effects, however, are not proof that epilepsy is characterized by parathyroid insufficiency.

Hæmorrhage.—The property possessed by parathyroid hormone of raising the blood-calcium level has been taken advantage of in the control of bleeding. Allen, Compere and Austin noted that the hypercalcemia induced by parathyroid was accompanied by increased viscosity of the blood; and that bleeding even from large vessels stopped very quickly. They tried parathyroid hormone in three cases of prolonged menstrual bleeding, the patients selected being idiopathic bleeders. They found that in all cases the bleeding time and clotting time were definitely shortened, the number of days of menstrual bleeding and the amount of blood lost were appreciably reduced, and during the intermenstrual period the patients were not so reduced in strength and vitality. They think it possible that the hormone may act by ionizing the calcium, or in some way activating it so as to hasten the formation of clot.

Gordon and Cantarow (Philadelphia) used parathyroid extract (Collip) as a means for controlling hæmorrhage from various causes, such as pulmonary, gastro-intestinal, and genito-urinary bleeding, and operative incisions, also in jaundice and other conditions in which the clotting time of the blood was prolonged. The total number of patients with hæmorrhage was 347, and cessation occurred in 304, following one or more transient increases in blood-calcium. The best results followed the injection of from 10 to 15 units every 36 hours for one to three doses. As a pre-operative measure in jaundice it reduced the coagulation time to within normal limits and apparently prevented hæmorrhage. Unfavourable results occurred when overdosage and prolonged administration were employed, also in blood dyscrasia (puerperal hæmorrhage and hæmorrhagic disease of the new-born) irrespective of the size and number of doses, apparently because of certain local changes in the tissues.

Jaundice.—It being evident that the increased amount of bile pigments in the blood and tissues in jaundice results in a functional deficiency of calcium, Cantarow, Dodek and Gordon investigated the response to parathyroid hormone. Fourteen cases were selected; one was hæmolytic in type, three were due to arsenobenzene, and ten were of an obstructive nature. The serum-calcium values varied from 9.3 to 12 mg. per 100 c.c., but the calcium content of the whole blood showed a much greater variation 4.8 to 12 mg. per 100 c.c. Twelve hours after the administration of parathyroid hormone, the variation in the whole blood calcium of jaundiced and non-jaundiced patients was practically identical.

Zimmermann (Chicago), on the other hand, states that elevation of the blood-calcium by injection of parathyroid hormone did not have a constant effect on the coagulation time of the blood in normal or icteric patients, or in animals. He observed no demonstrable changes in the serum-calcium level as a result of common bile-duct obstruction, but a regular delay in coagulation time was seen in such cases. Injection of parathyroid hormone effected no clinical improvement

in the condition of icteric subjects, and he concludes that to increase the calcium concentration of the blood does not have any effect in diminishing the coagulation time, either in the presence or in the absence of jaundice.

Fractures.—In view of the findings of Stewart and Pereival that parathyroid hormone increases the serum-calcium by drawing that element from the tissues, and probably also from the bones, it is unlikely that the administration of parathyroid substance would have any effect in the healing of fractures. French (Herrin, Ill.), however, claims that it has this effect, and reports two cases. He himself was struck by a car in the street, sustaining a fracture of both bones of the left leg below the knee, and was taken to hospital. While there he took desiccated parathyroid substance, 1/10 grain, three times a day. In eight weeks his leg was sufficiently healed to allow him to leave the hospital. His argument is that as he was 85 years of age the fracture would have taken six months to heal without parathyroid. He cites also the case of a lady of 87 who sustained a compound fracture of the thigh. Under the same treatment, the fracture healed in six weeks. In neither case is the argument in favour of parathyroid therapy very convincing.

On the other hand, Lehman and Cole (St. Louis) show pretty clearly that parathyroid has no effect in hastening the calcification of fracture callus. A series of carefully controlled experiments on animals with parathyroid extract demonstrated beyond doubt that so far from hastening the calcification of fracture callus, injection of parathyroid hormone rather tends to delay the process. This is only what might have been expected.

Dangers.—Hueper (Chicago) calls attention to some possible untoward effects of overdosage with parathyroid hormone. These include metastatic calcifications in various organs, notably the thyroid gland, lungs, heart muscle, stomach, duodenum and kidneys, the most marked effects being on the kidneys. Renal function is impaired by the gradual calcification of the tubular epithelial cells, the formation of calcium casts in the lumens of the tubules inducing retention of various components in the blood, with consequent deleterious effects to the organism. An increase of the blood-calcium to 10 to 15 mg. per 100 c.c. may be produced for some time without much risk, but a greater elevation will soon cause dangerous symptoms of the circulatory system, stomach and kidneys.

Dosage.—Parathyroid extract containing the active hormone as devised by Collip, known as "parathormone," "paracalcin," etc.—is standardized so that 100 units will increase the blood-calcium of a 20 kg. dog by 5 mg. in 15 hours. One cubic centimetre of the extract is equivalent to 20 units. In cases of true tetany, 20 to 30 units may be administered; in severe cases, this dose may be repeated if necessary twice or three times within the first 24 hours, the dosage being then diminished as indicated by the condition of the patient. In chronic cases, doses ranging from 10 to 25 units are sufficient to prevent recurrence of tetany.

The method of standardization originally proposed by Collip is based on the production of hyperealcemia in normal dogs. Hanson (Faribault, Minn.) recommends the use of parathyroidectomized dogs, which show abnormally low serum-calcium, the condition being restored to normal by administration of an active extract. Such animals show, 24 hours after operation, a drop of approximately 30 per cent. in the serum-calcium, without severe symptoms of tetany. An amount of extract is then administered that will increase the calcium level by 3 mg. in six hours—practically the normal level. His clinical unit is one-hundredth the amount required to produce a rise of 1 mg. under these conditions. His unit is thus much smaller—about 60 per c.c.—and his dose of 30 to 60 units, he claims, avoids the danger of hyperealcemia already referred to.

The employment of a "crystalline extract" soluble in water is described by Berman. This is prepared by extraction with acidified alcohol, removal of lipins and

proteins, and subsequent concentration. Dissolved in Ringer's solution and injected into the circulation, this substance has the property of definitely raising the calcium content of the blood, and at the same time reducing the electrical irritability of the nerves. Berman employs this action on the ulnar nerves as a means of estimating the strength of the preparation, in preference to determination of the serum-calcium. Injection of this crystalline substance (in solution) obviates the undesirable effects of parenteral protein introduction. Berman discusses the question of the effectiveness of parathyroid administered by the mouth, and quotes Hjort and Eder (*see above*), suggesting that the mode of preparation of the desiccated substance may have much to do with its efficacy or otherwise. He thinks that in the milder forms of parathyroid insufficiency, parathyroid by the mouth may be worth using.

Reviews.

MODERN MEDICINE: ITS THEORY AND PRACTICE.—By Sir William Osler, Bart., M.D., F.R.S. and Thomas McCrae, M.D., F.R.C.P. (Lond.). Vol. VI. Third Edition. London: Henry Kimpton, 1928. Pp. 964. Illustrated. Complete in six volumes. Sold in sets only. Price, £12-12 per set.

THIS is the sixth and last volume of this world-famous system of medicine. The first part deals with diseases of the nervous system and the second part with disease and abnormalities of the mind. Part I consists of nearly 900 pages; it is divided into 24 chapters, each of which is written by a specialist on the subject. Most of the contributors are American; there are four British contributors and one from McGill University. The whole subject of disease and abnormalities of the mind is dismissed by one contributor in 44 pages. This apparently unfair division at first surprised the reviewer. Presumably, the editor felt that the subject was too much that of the specialist to be given more space in a book of this nature. To the alienist, one can conceive, this chapter would not be of much assistance but to the student of general medicine the short but clear account of the various mental states given in this chapter is very helpful. General paralysis of the insane is dealt with in the first part of this volume under the heading of "Syphilitic diseases of the central nervous system"; the chapter is written by Dr. Sachs, whose name is so familiar, mainly in connection with the serum test for syphilis with which it is associated. It is rather surprising that he does not give more details of the malaria treatment about which he admits that he is enthusiastic. The only method of producing infection which is mentioned is by intravenous injection of the blood of a person suffering from malaria. The question of the species of plasmodium which should be employed is not discussed, nor is there any mention of the transmission of the disease by means of infected mosquitoes.

It is not possible to discuss the individual contributions to this famous "system." The reviewer has not had time to do more than glance through many of the chapters. They all appear to be well written, usually in excellent English; the printing, paper and binding are good; the book is expensive, but it is well worth the money.

L. E. N.

ACUTE APLASTIC ANÆMIA: ITS RELATION TO A LIVER HORMONE.—By A. Hayes Smith. London: H. K. Lewis & Co., Ltd., 1928. Pp. viii plus 80, with 3 illustrations. Price, 6s. net.

DR. HAYES SMITH's monograph is based on a single case of acute aplastic anemia. The author has given minute details of the case in the form of a day-to-day diary along with exhaustive pathological notes by Dr. C. J. Young, which must have entailed a considerable amount of labour and perseverance.

The consensus of present day opinion is that the Minot-Murphy treatment in cases of this kind by the oral administration of liver, either as a whole or in the form of a suitable extract, produces remarkably beneficial results. Nearly all the cases treated by this method seem to have responded kindly and readily to this treatment and few cases have relapsed. One of the immediate effects of giving liver extracts in these cases is a great increase of the reticulated red cells in the circulation.

The whole history of the case, the intelligent method of differential diagnosis supported by detailed laboratory evidence and the discussion on treatment form an instructive and interesting study.

In the opinion of the author, the present conception regarding the function of the bone marrow as an independent organ is erroneous. He holds that the bone marrow is a subsidiary organ dependent for the exercise of its function on a powerful hormone produced by the liver which helps to keep it in a state of functional tone, the deficiency or absence of this hormone being due to some toxin or "noxa" producing aplasia or death of the marrow.

The *modus operandi* of the treatment of cases of this nature by liver feeding, according to the author is explained by the "replacement" theory and is analogous to the treatment of myxœdema by thyroid medication.

J. P. B.

TUBERCULOUS INTOXICATIONS.—By Joseph Hollos, M.D. Edinburgh: E. & S. Livingstone, 1928. Pp. 132 plus lx. Price, Rs. 7-14.

THE main thesis of this work is that a large number of very diverse affections including neurasthenia, rheumatism, thyrosis and psoriasis are essentially of tuberculous origin. For the maintenance of this view, it is necessary to postulate two kinds of acquired immunity in tuberculosis—*antitoxic* and *lytic*. The former is demonstrable in those suffering from progressive tuberculosis, while the latter type is characteristic of cases showing hypersensitiveness to tuberculous infection without evidence of spreading disease.

The disturbances arising from this so-called "tuberculous intoxication" are in part due to a direct action on different organs; the greater number, however, result indirectly from the action of the tuberculous toxin on various endocrine glands. Treatment of these cases may, therefore, be either symptomatic or etiologic: the former line of attack consists in supplying the deficient hormone or hormones while the latter aims at eradicating the tuberculous focus which is at bottom responsible for all the signs and symptoms. Specific or etiologic therapy finds its chief application in the use of the immune blood treatment first discovered and described by Carl Spengler in 1908.

A large portion of the work is taken up with case histories illustrative of different arguments brought forward by the author in support of his main contention. The originality and boldness of Dr. Hollós' work make his book interesting reading. Whether his views will ultimately be accepted seems doubtful: it may be noted that it is now 20 years since Spengler's discovery. Even if one makes allowances for the disturbances incidental to the war period and for the traditional unreceptiveness of the medical profession, we still think that the treatment, if as successful as its protagonists claim, would be in more general use.

The printing and binding of the book are excellent and there is a good index.

J. M. H.

THE CLINICAL EXAMINATION OF THE LUNGS.—By E. M. Brockbank, M.D. (Vict.), F.R.C.P., and Albert Ramsbottom, M.D. (Vict.), F.R.C.P. Second Edition. London: H. K. Lewis and Co., Ltd., 1928. Pp. 112 plus viii, with 35 illustrations including 4 plates. Price, 5s. net.

THIS small book is intended to place before the student the salient facts in the routine examination of the lungs both in health and disease. The subject is treated on conventional lines and only the methods of

examination likely to be of real value to the reader are included. The book is adequate so far as it goes but under the heading of "Inspection" a description of Litten's "diaphragm phenomenon" might usefully have been given. In our experience, the mapping out of Krönig's lines demands a degree of clinical skill not possessed by the ordinary student.

A certain number of errors have crept in and it is hoped that these will be eliminated in future editions. On page 3; "Cartilage" should be "Cartilage"; on page 9; line 27, "of the" should be inserted after the words "Central portion" while on page 10, "diaphragm" lacks an "a." On page 6, the hypercritical might object to the use of the word "decently" with reference to chest expansion, but the point is a small one. The statement on page 43 that "the respiration rate is increased proportionately to the pulse rate in any febrile condition according to its severity" is open to criticism.

The four X-ray plates are excellent and there is a good index.

J. M. H.

NUTRITION AND DIET IN HEALTH AND DISEASE.—

By James S. McLester, M.D. Philadelphia and London: W. B. Saunders Company, 1927. Pp. 783. Price, Cloth, 36s. net.

IN this book, the learned author has ably dealt with the subject of nutrition and diet in health and disease in all its important bearings and in its various aspects, chemical, physical, physiological, pathological and economic. The book is a mine of carefully collected and well arranged information which, we are sure, will be found interesting and profitable reading by all students of food and dietetics. References to literature on the subject are most generous and would prove very helpful to a further and advanced study of the subject. The chapter dealing with "the nutritional factors of fundamental importance" contains a very interesting and critical review of our up-to-date knowledge in the matter of digestion, absorption and utilisation of the various nutritive principles of food. The question whether the animal organism is capable of utilising inorganic compounds of metals and non-metals, such as sodium, potassium, iron, calcium, phosphorus, iodine, etc., has been the subject of much interesting controversy. The author has ably discussed this subject, and by references to a large number of successful experiments carried out by numerous reliable investigators, has come to the conclusion, that inorganic substances can be utilised in the system, whether they are presented as such or in some inorganic combination.

We are in full agreement with the author in his estimate of the quantity of protein daily required by a healthy individual engaged in ordinary work. The author has fully discussed the subject and after giving due consideration to the opinions and observations of the two opposing schools (the German school headed by Voit and others, and the American school headed by Chittenden) has come to the conclusion that the estimate of the German school is approximately correct and that "to enjoy sustained vigour and to experience his normal expectancy, man must eat a liberal quantity of good protein. By liberal is meant an amount in excess of his theoretic needs, such an amount as the race, in its long experience, has instinctively chosen—say, 100 grammes daily, more or less. By good is meant proteins or protein mixtures which are of high biologic value, in which the proteins of meat or milk, preferably of both, find first place." We may incidentally mention here that the investigation into the diet of some of the races living in India conducted by McCay, MacCarrison and others strongly supports the author's conclusion as to the importance of a liberal supply of good protein in the daily diet for the maintenance of health, strength, and resisting power to infection. One of the causes of the poor health of the people of certain provinces in India, is, in our opinion, chronic protein starvation.

Much useful information as regards the proper selection of diet in various diseases (such as diabetes, gout, deficiency diseases, diseases of the kidney and of the

digestive organs, enteric fever, tuberculosis, etc.) is to be found in the portion of the book devoted to the consideration of diet in disease. Some of the old time and ill-founded notions on the subject have been successfully combated and the evils of a starvation diet in enteric fever have been prominently shown by the author. A good case for the liberal administration of milk in combination with food articles of high caloric value, such as butter, cream, eggs and cereals has been made out by the author in the treatment of typhoid fever. The chapters on diet in disease will amply repay perusal.

The book is a valuable contribution to our up-to-date knowledge of diet and nutrition and should find a place in the library of every student of medicine.

J. P. B.

DIAGNOSIS AND TREATMENT OF DISEASES OF THE STOMACH: WITH AN INTRODUCTION TO PRACTICAL GASTRO-ENTEROLOGY.—By Martin E. Rehfuess, M.D. Philadelphia and London: W. B. Saunders Company, 1927. Pp. 1236, with 519 illustrations, some in colours. Price, Cloth, 55s. net.

THE author says that he has written this book in the manner in which the subject appeals to him. He has certainly produced a very practical volume which will be a valuable addition to every medical library, and especially useful to the increasing number of Indian doctors who are taking an interest in diseases of the stomach. The word gastro-enterology does not come easily to us, but the subject as presented by Professor Rehfuess is very fascinating and his method has resulted in one of the most readable medical books we have perused for some time.

The approach to the study of gastric disease, Chapter II, explains the multitude of ways in which gastric disturbances can occur, and stresses their relation to diseases of other organs. We are reminded of the intimate functional association and close correlation of different segments of the digestive tract and of the influence of the ingestion of irritants or the effects of other substances acting indirectly through the nerve supply, vascular channels, or by elimination (morphia, emetine, etc.). Toxins, infections (e.g., influenza), infectious disease may so alter the irritability of the gastric musculature, suppress its secretions, or damage its mucous membrane that the causative lesion may be overlooked, and the possibility of disease in another part of the body or of a constitutional condition such as phthisis not considered. This theme is elaborated in Part III, where the relation of the stomach to diseases of the œsophagus, liver, gall bladder, pancreas, intestines and nervous system is discussed.

The earlier chapters contain a very full and complete account of the anatomy, embryology and physiology of the stomach, of physical examination and of gastric technique. The author's conviction that the well-trained gastro-enterologist should be able to carry out every investigation and procedure himself should be comparatively easy with his graphic and well-illustrated descriptions of modern technique. The chapters on the gastro-enterological laboratory, chemical technique and gastric analysis will be invaluable to the clinical pathologist, while that on X-ray examination is equally satisfying. Too often the reading of a negative, the most important part of X-ray work, is left to the radiologist and we agree that it is the clinician, trained by experience in interpretation, and fortified by information from a number of different sources, who is generally best able to reach conclusions. A series of radiographs, which must be taken in every plane, if an ulcer is insisted upon; and one realises the futility of the one or two exposures which are often expected to satisfy the demand for a radiological examination of the stomach. The value of fluoroscopy, not used nearly enough in our own clinics, and the facility obtained in interpretation by constant study and incessant practice is well demonstrated. Careful preparation with belladonna or atropine over some days is

advocated and will frequently "iron out" spastic phenomena, the presence of which may make a correct interpretation difficult or impossible.

Part II is concerned with organic diseases of the stomach and the discussion on the ætiology of ulcer is one of the most interesting we have read. Rogers' Indian statistics are quoted to support a claim that vegetarians are almost free from these conditions, but work in South India has shown that this is not correct and suggests that the universality of the disease is influenced by the poorly balanced diets of the people. The author's observations lead him to the following important indications for treatment:—(1) "To get rid of anything likely to induce acute ulceration, focal infection of whatever kind, toxins of every variety and description, and foods which are irritating or difficult to digest (2) To remove the factors producing chronicity, namely, free acidity, spasm, and retention, and toxæmias of every kind which might induce ulcer chronicity." Elaboration of these principles supported by experimental and clinical evidence gives the reader a very clear insight to the theory and practice of ulcer treatment. Every modern system is fully described. Indications for surgical interference are clearly stated and we could only add one, namely, the economic position of the patient, a very important factor with Indians and which calls for an earlier resort to surgery than is general in Europe. Evidence is quoted which suggests that malignant degeneration of an ulcer occurs more commonly than we supposed, though from our own experience we believe that cancer and perforation are both rare conditions in Southern India. Every teacher will agree that our students have been taught the regular text-book description of gastric carcinoma, and that almost every symptom in it is a death warrant to the patient. A latent period is said to last from four to eight months and is usually the vital period for diagnosis. The author calls for an expansion of the regular diagnostic surveys, such as life insurance institutions are practising, and demands a complete X-ray examination of the stomach and digestive tract, a method which he believes will reveal the evidence of a lesion in 96 per cent. of all cases. "In other words, not only is the public to be educated to the necessity of routine complete examination during the cancer age, but the physician must be educated to a knowledge of early and not late carcinoma." Space is found for a discussion of the work of Gye and Barnard in relation to gastric cancer.

In Part III, excellent descriptions are given of gastric crisis, the effects of diseases of the nervous system, while Dr. I. B. Deaver contributes a very clear account of the surgery of the stomach. A busy practitioner will consult with profit the concluding chapters. Under medical treatment notes on useful preparations, formulae and methods of value to the gastro-enterologist are given. Under dietary considerations the action of various foodstuffs and beverages on the stomach is fully discussed, and the final chapter contains useful diet and instruction charts. The research worker will find a full bibliography at the end of all important chapters, and stimulation to further investigation of these diseases in India in nearly every page.

GYNÆCOLOGY.—By Howard A. Kelly, A.B., M.D., LL.D., and Collaborators. New York and London: D. Appleton & Co., 1928. Pp. 1044, with 767 illustrations and 16 coloured plates. Price, Rs. 37-8 net. Obtainable from Butterworth and Co., Calcutta.

In the autumn of his life, Howard Kelly, the father of modern gynæcology, has produced this monumental volume in collaboration with the younger generation of American gynæcologists. Mere praise is not sufficient, for anyone who has a conception of the task of producing a book, will appreciate the time and energy expended by an author nearing the biblical age limit. Verily we can say, *Si monumentum requiris, circumspice*. Verily we can say, for 18 of the 49 chapters are by Howard Kelly himself, written with that charm and balance of thought, which

has distinguished every production from Baltimore during the last 30 years.

For many years to come, this book will be a standard one, not merely because of the fame of its author, but for its illustrations, wealth of detail and pathological sanity; moreover, each section has the cachet of being written by a recognised expert, who not only gives his own views, but summarises the historical side of the outlook.

This book is not one for students, but for the post-graduate or interne, who is endeavouring after an extended course of anatomy, post-mortem and pathological work to become a specialist in gynæcology.

Among the younger generation, it is a common idea that knowledge of books rather than that of the dead house and its pathological aspects, is sufficient for him to call himself a specialist. To America, and especially to Johns Hopkins Hospital, we owe a debt of gratitude, for their insistence on advanced anatomy and pathology as part of the curriculum before any post-graduate comes on the interne specialist staff. The proof of this most excellent system is here before us in this book, and it would be a good day for India when every university in Great Britain made it a rule that before graduates of Indian Universities sought the cachet of a higher qualification, a certificate was necessary that a specialist revival course in pathology, anatomy, physiology and perhaps bio-chemistry had been undertaken, for then theory and practice would go hand in hand, and the qualifications mean something more than so many letters after a name.

Howard Kelly and the school he so nobly represents, was the pioneer of this idea, and in choosing his collaborators, this fact is pre-eminent. The whole field of clinical and pathological findings is wonderfully depicted and there is no method of investigation and treatment omitted, including protein therapy, radium, pneumoperitoneal roentgenography, ultra-violet radiation, psychiatry, etc.

In a book so extraordinarily well produced, it is difficult to pick out one chapter that is better than any other, but if the reviewer was asked which was the best, or which the one that gave most pleasure, he would say the chapter on the general principles of abdominal surgery written by Howard Kelly himself, 37 pages of great experience and wisdom.

Shadows are passing across the sun, but it can be no mean pleasure to the revered author of this book, to feel that wherever the English language is spoken and higher gynæcology is practised, his name and principles will continue to inspire the younger generation of gynæcologists.

V. B. G.-A.

THE PRINCIPLES AND PRACTICE OF OBSTETRICS.

—By Joseph B. De Lee, A.M., M.D. Fifth Edition. Philadelphia and London: W. B. Saunders Company, 1928. Pp. 1140, with 1128 illustrations on 923 figures, 201 of them in colours. Price, 55s. net.

THE name of Joseph De Lee as a master of obstetrics is too well known to need introduction, and the reviewer has no hesitation in saying that this fifth edition, the outcome of team work in the Chicago Maternity Hospital, is a splendid piece of work, for it bears the imprint of the clinician rather than the theoretician.

The population of Chicago is polyglot, and it is interesting to see and read of conditions in this great lying-in hospital, which are to be found almost any day of the week in Calcutta. It is difficult for the clinical obstetrician to say anything new about the fundamental art of his specialty, but Dr. De Lee not only says things in a new way, but takes care to rub in his point by most excellent illustrations, for instance, measuring the outlet, illustrating puerperal abdominal exercises, and his most excellent method of Cesarean section.

There are altogether in 1140 pages, 1128 illustrations, so that for the student, although the print is small, the reading matter is easy to follow.

It is interesting to note that the author has very little first hand knowledge of osteomalacia, having seen only

one case, and that an imported one, moreover, it would appear that the funnel-shaped pelvis is rare in Chicago. Both these facts tend to corroborate the reviewer's hypothesis that the funnel-shaped pelvis and osteomalacia are closely related to food errors in childhood or at puberty, for in America as is well known, the benefits of a proper dietary and sunlight have been long recognised.

It would be invidious to pick out any one portion of this most excellent clinical book, but if one may say so, the feature that strikes one most is the conservatism of the author, which is all to the good in its way, but it must be remembered that exceptional circumstances demand exceptional treatment. For instance, Dr. De Lee seems timid or lukewarm in his adoption or recommendation of Caesarean section for placenta previa, extended breech presentation, prolapse of the cord, post-maturity, and elderly primiparity: nor does the text indicate that the author himself has done the operation for any of these conditions.

Naturally, the reviewer turns to the portion of the book which deals with that type of Caesarean section for which the author's name is exalted by all obstetricians in the East, namely, the low cervical method, for this is the ideal operation in India, considering that two-thirds of the patients that are seen with absolute indications for Caesarean section arrive in hospital after multiple examinations and early rupture of the bag of membranes.

In Chicago, out of 620 operations only six died, and the reviewer's experience of a great many cases which in former days would have been treated by craniotomy, or hysterectomy is the same. He has no hesitation in reiterating that once the technique of this operation is mastered, all obstetricians in the East will agree that it is the ideal operation for the late cases seen in the East with the foetus alive, and particularly in osteomalacia.

There is only one criticism the reviewer would make of the illustrated pages in the text of this book, and that is, that Dr. De Lee has not seen fit to mention a small but still a very great improvement in his operation, namely, the modification of Dr. Hendry of the Glasgow Maternity Hospital who first advocated that the incision in the lower uterine segment should be curved transversely, with its convexity downwards. This method of incision makes the emergence of the foetus easier, the suturing easier and greatly diminishes the risk of injury to the bladder, or tearing of the uterus into the vaginal portion of the cervix or upper uterine segment.

Having done a great number of these operations according to the method of Dr. De Lee and also that of Dr. Hendry, the reviewer has no hesitation in earnestly recommending the important modification abovementioned.

There is just one little point in the text and technique which is new to the reviewer and which he intends to follow in the future, namely, to inject $\frac{1}{2}$ to 1 c.c. of pituitrin into a vein the instant the head is delivered, for although not common, on two or three occasions, the bleeding for a few moments has been somewhat alarming.

This is a book that should be on the shelf of every practising obstetrician from a teaching and reference point of view.

V. B. G.-A.

FIRST AID IN CHILD-BIRTH.—By Hon. Dr. U. Rama Rau. Published by Sri Krishna Bros., Madras, 1928. Pp. 79. Price, As. 4.

DR. RAU is to be congratulated for the public spirit and enthusiasm he has shown in bringing out this little volume for the aid of mothers and midwives in rural India.

India is awakening to the fact that countless lives are sacrificed from ignorance of the first principles of child-birth, and one feels that if charitable bodies, municipalities and local governments would stir in the matter, the present apparent apathy would disappear, for there is no question that with the growth of education, the great public of India will demand a greater knowledge of obstetrics than it has at present.

Dr. Rau has quixotically entered the arena and has rendered in a small way and by a small beginning what may be a great service. He has put the proposition simply and without prejudice, and he tells us that this little book is to be translated into all the vernaculars in the Madras Presidency. It cannot help being of service to the expectant mother, and just as after the war in Europe, the general public began to grasp the importance of sterilization and surgery, so in like manner if this book, or others of its kind, is in the hands or at the disposal of the public, the effect will be not only to lessen infantile and maternal mortality, but equally important from an educational point of view, to raise the standard of knowledge, training, and equipment of all those who may be called to attend an expectant mother, either before or in labour.

V. B. G.-A.

A TEXT-BOOK OF ACTINO-THERAPY: WITH SPECIAL REFERENCE TO ULTRA-VIOLET RADIATION.—By D. D. Rosewarne, M.R.C.S. (Eng.), L.R.C.P. (Lond.). London: Henry Kimpton, 1927. Pp. viii plus 237, with 20 illustrations including one coloured plate. Price, 9s. net.

So many works have been written on this subject that one is inclined at first sight to look askance at any new publication. The present book under review, however, has points of its own to recommend it. In the first place, it has been written from the point of view of the student and general practitioner, and consequently, the language is simple and unaffected. Another point in which it differs from all other publications is in the omission of elaborate descriptions of apparatus. The main principles of the different types of lamps and arcs and radiators are concisely explained and the rest left to trade publications.

Another interesting point is the author's advocacy of the direct skin test. He asserts it to be the only reliable clinical guide and that it cannot be replaced by any other method.

An interesting feature is the chapter on auto-intoxication, for which the author lays stress on combined treatment. As he puts it, "Actino-therapy is not a cure for all human ills."

Here we have a book written from an entirely disinterested point of view, thoroughly up-to-date, and deserving of the highest commendation.

MENTAL DISORDERS: A HANDBOOK FOR STUDENTS AND PRACTITIONERS.—By Hubert J. Norman, M.B., Ch.B. (Edin.), D.P.H. (Edin. & Glas.). Edinburgh: E. & S. Livingstone, 1928. Pp. 463, with 57 illustrations. Price, Rs. 10-8. Available from Messrs. Butterworth & Co. (India), Ltd., Calcutta.

BEYOND affording the reader some idea of what the author imagines a text-book should be, this publication does not appear to be likely to serve any very useful purpose for it contains nothing new and a great deal that is very old. Dr. Norman thinks that most people who read text-books on mental diseases, "skip lightly over" any portion of the book which deals with psychology in order to get as quickly as possible to that which deals with psychopathology. For this reason, the book opens with a chapter labelled "Insanity and Conduct" and whatever there is of psychology comes much later. Indeed, one of the features of this book is its way of springing surprises on the reader through its utter lack of arrangement. For example, after 106 pages devoted to a discussion of some of the major psychoses, we reach a chapter entitled "Borderland." This is followed by a chapter on "Mental Deficiency" and then, (Shade of Charcot!), "Hysteria" leaps into view. Some idea of the archaic views of the author can best be illustrated by a reference to his discussion of what he terms the neurasthenic-neuropathic disorders. Under this heading he classes neurasthenia and psychasthenia. In discussing the differential diagnosis of neurasthenia, he states that it is to be diagnosed from, among other conditions, psychoses. He omits entirely to note from which particular psychosis, an omission

which is very unfortunate as one of the commonest errors of the general practitioner is to diagnose neurasthenia in early cases of dementia præcox. The author's treatment of psychasthenia leaves even more to be desired, for he applies his term to a variety of neuroses which have no relation to the condition which Janet first called psychasthenia. For example, he lumps together the hysterical phobias and all obsessional states as varieties of psychasthenia. And so the book goes bouncing on from one topic to another, until the reader, faint yet pursuing, gets a chance to regain his wind with a so-called "Historical Survey." Dr. Norman holds some rather exotic views on instincts and their perversions besides labouring under the misapprehension that the term "sadism" is derived from the name of Sacher-Masoch because he "first described it." Having delivered himself of this piece of fiction, the author performs yet another somersault and lands into a dissertation on morbid anatomy. Then follows a chapter on treatment, after which the reader is invited to take a dive into a whirlpool of legal technicalities. But the end is now in sight, so that, after wading through the shallows of two appendices, the reader finds himself once more on comparative *terra firma* in the form of a bibliography.

O. B. H.

INTRODUCTION TO PRACTICAL BACTERIOLOGY.

—By T. J. Mackle, M.D., D.P.H., and J. E. McCartney, M.D., D.Sc. Second Edition. Edinburgh: E. & S. Livingston, 1928. Pp. 416. Available from Butterworth & Co., Calcutta. Price, Rs. 7-14.

It seems only about a year ago that the writer had the pleasure of reviewing the first edition of this excellent little book. Apparently, three years have slipped by. The fact that a second edition was called for in so short a time is excellent testimony to the value of the book.

It will be observed that this book is going the way of all its kind—perhaps the right way and it appears to be the inevitable way—it has undergone considerable enlargement. Bacteriology is a rapidly advancing science and it is essential that further advances in our knowledge should be included in a book of this nature; in this matter, the authors have bowed to fate, but was it necessary to add to their troubles by enlarging the scope of the book? For the purposes of this book, the malarial parasite, the Leishmanias (the reviewer prefers "Leishmanias," but he is probably in a minority) and other protozoa are bacteria. The book is certainly not written for the trained bacteriologist; it should be a very valuable book to the student going in for an examination and on occasions one could conceive of its being used by a general practitioner who wanted to know something about an organism which he had seen referred to in a journal. But would it help any member of either of these classes to read the very accurate information given on the two small pages which are devoted to Leishmania? The reviewer is certainly prejudiced and is probably wrong. Perhaps after all, if a student were asked in an Edinburgh M.B. examination what he knew about the species of the genus *Leishmania* and he repeated this section word for word, he would get full marks for knowing more about the subject than did the examiner. Nevertheless, his knowledge would be of no practical value to him.

The reviewer has really nothing but praise to offer regarding this very valuable little book; the above remarks are mere quibbles. The book is of convenient size, it is excellently printed, well bound and is very good value for the money.

L. E. N.

AN ELEMENTARY LABORATORY GUIDE IN GENERAL BACTERIOLOGY.—By Harold J. Conn. Baltimore: The Williams and Wilkins Co., 1927. English Agents: Ballière, Tindall & Cox, London. Pp. 165 plus ix, with 27 figures in the text. Price, 13s. 6d. net.

This is easily the most expensive book, words per shilling, that we have ever had the pleasure of reviewing.

The main portion of the book consists of 137 pages of which 66 are blank. The remaining 71 pages contain numerous illustrations, so that this part of the book contains probably less than 24,000 words and the price is thirteen shillings and sixpence. It is only fair to mention that there is an appendix consisting of 20 pages printed on both sides of the paper.

The book is more suitable for the higher grade laboratory attendant than for the medical student, but should prove useful to the latter. All mention of specific organisms is most studiously avoided, presumably to prevent the beginner from attempting to run before he can walk; the idea is a good one.

The subject is clearly dealt with and the illustrations are very helpful.

The get up of the book is excellent, although, when space is to be left for notes, interleaving is, in our opinion, a better plan than that adopted in this book, namely, printing on one side of the page only.

L. E. N.

PERCIVAL'S MEDICAL ETHICS.—Edited by C. D. Leake. Baltimore: The Williams and Wilkins Co. English Agents: Ballière, Tindall and Cox, London, 1927. Pp. xiv plus 291, with 11 plates. Price, 13s. 6d. net.

DR. PERCIVAL was born in Lancashire in 1740. He practiced in Manchester. He was a distinguished physician who, amongst other things, introduced, or rather re-introduced, the use of cod-liver oil in the treatment of debilitating diseases. His name has not been, as far as the reviewer is aware, attached to any fracture, disease or sign, but he will always be remembered in medical history as the writer on sociological subjects and more particularly as the author of "Medical Ethics."

It is on this book that the medical ethics, or perhaps it would be better to say, "codes of medical etiquette," of the English speaking races have been founded. It is surprising how little of this code is not literally applicable to-day. Just as one realises how necessary it is to pass on Lord Chesterfield's advice in his famous letters to his son written in 1750, that when you have blown your nose you should not, in public at any rate, inspect your handkerchief to see what has happened, so in malaria-ridden Bengal at the present day one sees the wisdom of the following quotation from Percival:—

"The duty and responsibility of the physician, however, are so intimately connected with these points, that no dependence on the probity of the apothecary should prevent the occasional inspection of the drugs, which he prescribes. In London, the law not only authorizes but enjoins a stated examination of the simple and compound medicines kept in the shops. And the policy that is just and reasonable in the metropolis, must be proportionally so in every provincial town, throughout the kingdom. Nor will any respectable apothecary object to this necessary office, when performed with delicacy, and at seasonable times; since his reputation and emolument will be increased by it, probably in the exact ratio, thus ascertained, of professional merit and integrity."

It is a book that could with advantage be read by every member of the profession in India, or in any country; if his conscience is quite clear when he reads that, "No physician or surgeon should dispense a secret *nostrum*, whether it be his invention, or exclusive property. For if it be of real efficacy, the concealment of it is inconsistent with beneficence and professional liberality. And if mystery alone gives it value and importance, such craft implies either disgraceful ignorance, or fraudulent avarice," then perhaps he may have some qualms when he comes to the next page and reads, that he "should avoid all contumelious representations of the faculty at large; all general charges against their selfishness or improbity; and the indulgence of an affected or jocular skepticism, concerning the efficacy and utility of the healing art."

In the appendices the "Code of Ethics" and the "Principles of Medical Ethics" of the American Medical Association are reproduced. Although the book is

produced mainly for the benefit of the American medical practitioner it could be read with equal profit by and to practitioners of any country.

The format of the book is good and suitable.

L. E. N.

HOW TO START IN GENERAL PRACTICE.—By Isaac G. Briggs, M.R.C.S., L.R.C.P. London: John Murray, 1928. Pp. 158. Price, 6s. net.

THAT the modern medical curriculum is theoretically adequate along certain limited lines may or may not be true, the point is a debatable one. That it fails miserably to give the student an adequate insight into the thousand and one difficulties that beset the path of the medical man in the first few years after qualification, admits of no debate at all. The man fresh from school knows little enough about the common ailments that the general practitioner is called upon to treat; of such essential matters as equipping his dispensary or surgery, adapting his house or rooms to the requirements of his profession or the art of "handling" different types of humanity, he is abysmally ignorant and his ignorance is likely to cost him dear both in pocket and in reputation.

Dr. Briggs deals adequately and concisely with the very problems that are likely to confront the beginner in general practice—where and how to "set up," the technical and legal difficulties in so doing, the building and furnishing of the house or "rooms," the economical purchase of instruments and drugs and the storage and dispensing of the latter. We would strongly urge all those who intend to practice medicine—and after all general practice is the only real "practice of medicine"—to read this little book. It is wholly admirable.

J. M. H.

Annual Reports.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. REPORT ON THE WORK OF THE TROPICAL DIVISION FOR THE YEAR 1926-27.

THIS report is the last of the separate annual reports of the London School of Tropical Medicine in its old setting, for with the year 1927-28 other departments of the new big London School of Hygiene and Tropical Medicine were opened. It is a report which will interest the many former students of the School in India.

Dr. Andrew Balfour reports that the change in the D.T.M. to a 20 instead of a 12 weeks' course has been all to the good. Unfortunately, however, it means that batches of men from the Colonies can only be set free to attend the classes twice a year, instead of three times, as formerly. When the School moves to its new and commodious quarters, new arrangements may be possible. At the 1926-27 courses there were 69 students for the ordinary course, and 5 for the special course; at the March-July 1927 session, 72 students for the ordinary course, and 9 for the special course. One hundred and fourteen, out of 124 competing, passed the School examination; and 36 of them gained distinction; also 49 out of 96 competing gained the D.T.M. & H. (Eng.). The Lalcaca and Duncan Medals both went to Dr. H. W. Kumm, of the Johns Hopkins Medical School, Baltimore. Among the 155 students at the School during the year, 79 belonged to the colonial services, 1 to the R.A.M.C., 9 to the I.M.S., and 11 to different missions. A new departure of the year was the institution of a course of lectures in tropical hygiene and sanitation to I.C.S. probationers. A special course in malariaiology has been arranged, in conjunction with the Mosquito Control Institute at Heyling Island and the entomological field station of the Wellcome Bureau of Scientific Research, but only one student put in for this course, which will not be given unless there are at least 6 applicants.

With regard to the staff a new Division of Medical Zoology was created, to include the departments of entomology, helminthology and protozoology, and Professor Leiper was appointed Head of the Division. New posts of Lecturer and Milner Fellow were created, and Dr. T. W. M. Cameron, Dr. J. T. Duncan and Dr. A. Robertson were appointed to them.

Turning to the different departments, there were many changes in the staff of the Entomology Department. Dr. Dudley Buxton writes of the necessity for concentrating teaching on a few types dealt with rather fully, rather than on trying to cover a more comprehensive schedule in three weeks. The most important event of the year was the opening of a field station at Farnham Royal, Buckinghamshire. Dr. Buxton's memoir on his investigations in Samoa was prepared for publication, whilst Dr. Wigglesworth investigated the process of digestion in the cockroach, a preliminary to a study of the digestive processes of blood-sucking insects—a subject about which extremely little is known. Dr. Mary V. Beattie studied the relationship between the thermal death point of the blue-bottle fly and atmospheric humidity, whilst Professor Nuttall and Mr. C. Warburton examined, overhauled and identified the collection of ticks.

In the Helminthology Department, Miss J. Leishman was appointed Milner Research Scholar and Demonstrator, and has carried out research work on the cercaria of *Schistosoma* and the development of *Trichinella* and *Strongyloids*; Dr. Cameron has continued his studies on the evolution of lung worms and hydatid. He has also given much attention to helminthic material collected from the London Zoological Gardens. Dr. Cameron also received the D.Sc., Edinburgh, during the year for a thesis on economic helminthology. In the Protozoology Department, Dr. J. G. Thomson comments on inadequate facilities for teaching. Major J. A. Sinton, V.C., I.M.S., spent about two months in the Department during the year. Dr. S. Annecke investigated the biology of the malaria parasites, and also the anopheline carriers of South Africa. He was further deputed to study and report on the antimalaria work carried out in Italy under the auspices of the League of Nations. A finding of importance during the year is that, whereas *Trypanosoma rhodesiense* soon becomes stabilised in virulence for laboratory animals, *T. gambiense* appears steadily to decline in virulence. A long list of trypanocidal drugs was experimentally tested during the year, and much work carried out on the pathology and parasitology of malaria.

In the Department of Tropical Pathology and Bacteriology, again, there were changes in personnel. Dr. H. B. Newham comments on the amount of time and labour which has to be given to teaching, and especially to the preparation for the practical classes and providing material. The phenomenon of sedimentation of the red blood corpuscles in different diseases was studied, and Dr. R. M. Morris obtained his M.D., London, together with the Gold Medal for his researches on the output of urobilinogen and urobilin in sprue. Dr. Duncan investigated the relationships of *Micrococcus melitensis* and *Bacillus abortus*—a subject upon which there is now an extensive literature. The museum is being added to, and every endeavour made to make it as representative as possible.

Clinical material is readily available at the London School from the Hospital for Tropical Diseases in Endsleigh Gardens, and the Seamen's Hospital Society's Hospital at the Royal Albert Docks. Dr. Manson-Bahr made a donation of a large collection of laboratory specimens from clinical cases under his care, and was having a series of X-ray transparencies with regard to the differential diagnosis of liver abscess from conditions in the lung prepared. The usual lectures by visiting lecturers were given; also special cinema lectures.

The Egyptian Government asked for Professor Leiper's services to be lent to them for a limited period as adviser with regard to the prevention of schistosomiasis in Egypt. Dr. Andrew Balfour and Dr. Manson-Bahr were appointed members of the new

Colonial Medical Research Committee, whilst the old students of the School continue to render loyal support in the way of sending material. The future museum in the new building is being organised, and received several valuable exhibits.

In the appendix to the report there is given a detailed list of the 62 papers, reports, etc., published by the staff of the School during the year.

In some ways one regrets that this is the last annual report of what was formerly the London School of Tropical Medicine, for the School was especially associated with the name of Sir Patrick Manson, and its record, both in war and peace, is a magnificent one. Its future, however, in the new building, as part and parcel of the new London School of Hygiene and Tropical Medicine, will be even more important, one realises, in the immense field of tropical medicine in the British Empire.

REPORT ON THE PRISON ADMINISTRATION OF BURMA FOR THE YEAR 1926. BY LIEUT.-COL. P. K. TARAPORE, I.M.S., INSPECTOR-GENERAL OF PRISONS, BURMA. RANGOON, SUPD.T., GOVT. PRINTING, 1927. PRICE, RS. 5.

THERE was no change in the number of central and district jails in the province during the year. A notable feature of the year, however, is that Government has approved of a proposal to construct an institution which will serve as a hospital for 100 tuberculous prisoners and 100 leper prisoners, with a common laboratory.

The daily average number of prisoners was 19,267, an increase on the previous year of nearly 2,000. The majority of newly convicted prisoners came from Rangoon—4,000; whilst Insein came next with 2,334. Seventy-one prisoners who volunteered for service in the Andamans were transferred there, and 21 to the Mental Hospital at Ranchi. No less than 85 per cent. of prisoners admitted during the year were Buddhists (Burmans, one supposes), which corresponds to the caste distribution in the province. The number of boys sent to jail shows an unwelcome increase, but "the question of the treatment of young offenders on reformed lines is still under the consideration of Government."

Seventy-three per cent. of prisoners admitted during the year were literate, 3.62 per cent. able to read, and 23.6 per cent. quite illiterate. During the year Government sanctioned, as an experimental measure, the provision of schools in jails to impart education to prisoners by paid teachers. The results so far have been satisfactory, and the scheme has been continued experimentally for another year.

There is a slight tendency in the figures to show that the courts are gradually reducing the number of short term sentences inflicted, but this serious question does not appear to have been really tackled as yet. Forty per cent. of prisoners admitted during the year were confirmed offenders and "habituals" constituted 35.27 per cent. of the total population.

Some 40 per cent. of habitual prisoners and 15 per cent. of casuals return to jail within three years of release. "As regards the enquiry into the age at which habituals start their criminal career, it was shown that about 30 per cent. were under 21 and about 70 per cent. under 30 years of age at first conviction. These figures would appear to indicate that the problem of habitual crime in Burma is that of the correct treatment of the young offender, and that our present methods of treatment of the young delinquent are far from satisfactory."

There were 12 escapes during the year, 1 from inside the jail, and 11 from extra-mural gangs outside the jail. The 12 recaptured included 2 who had escaped in a previous year. Several escapes of recent years having been effected by prisoners uprooting papaya trees and using them to scale the wall, a rule has been made that no papaya or plantain trees are to be planted within jail compounds, and those already there are to be removed. In Rangoon, a prisoner was sent to the General Hospital for emergent operation for acute intestinal obstruction and escaped; he was recaptured a week later, though no details are given as to what

treatment he received in the meantime. One prisoner had the audacity to escape in private clothing belonging to a sub-assistant surgeon who was on duty at the time, though he had only two more days' time to serve—an instance of misplaced enthusiasm.

Considering the great increase of the convict population, discipline was good throughout the year, and the total number of jail offences and punishments showed a substantial decrease. In this connection, Col. Tarapore makes the following pertinent remarks: "The opinions of most experienced Superintendents are unanimous that the present strength and quality of the staff makes it difficult to supervise the prison population efficiently, especially the habitual class from whom most of the 'bad hats' are derived. Practically all the serious assaults are made by 'bad hats' who need constant supervision. The remedy lies in isolating incorrigibles in a cellular jail, as is being done in the Madras Presidency, with a strong and capable staff."

The number of corporal punishments inflicted during the year diminished by about one half. During the year Government discontinued the experimental issue of tobacco to well-behaved prisoners who had been free from punishment for three months; the Director-General is of opinion that this is a mistake, for the issue tended to assist discipline.

Of the 35 offences committed within jail and tried by the criminal courts, 20 were for assault, 6 for escapes, and 2 for attempts at suicide. Twenty-three out of these 35 cases were among habitual prisoners. As a class, habituals are usually well behaved and accustomed to the routine of jail life; on the other hand, when they are obstreperous, they can make a prison Superintendent's life a very difficult one. At Insein jail the concentration of a large number of such convicts made it very difficult to manage them with the existing staff sanctioned.

Convict officers, both male and female, are still employed in the Burma jails, and there was actually a difficulty in finding a sufficient number during the year owing to the large number of prisoners of this class sent out on ticket-of-leave. Although the convict officer scheme is frowned upon officially, yet in actual practice it works well, and it is difficult to see how all prisoners are to be guarded by non-prisoner guards under existing conditions of financial stringency.

The daily number of under-trial prisoners increased during the year, and their average period of detention works out at 25.43 days. No less than 54 per cent. of such cases result in acquittal, and this antiquated system means not only that innocent men are kept in custody far longer than is necessary, but also increased cost to Government in their maintenance. The reason for this state of affairs is the inordinate time which it takes to settle cases in the Indian law courts. Four weeks' provisional detention for an innocent man appears to be rather a hardship.

With regard to finances, the total expenditure on the department during the year was Rs. 22,04,085, but the average cost per head was reduced, the large increase in the total number of prisoners being chiefly responsible for the increased budget. The cost of diets is likely to be seriously increased in future, since Government have rescinded the previous orders which allowed all articles shipped by Government steamers for jails to be carried free. The cost of clothing and bedding increased with the increase in the number of prisoners, and with the supply of bedding and clothing to ticket-of-leave prisoners. The issue of khaki uniforms to warders, whilst entailing an increased initial expense, is likely ultimately to save money, since three khaki suits are now issued every two years as against two blue suits per annum previously.

The jail gardens, as usual, continued to show a useful profit, garden produce to the value of Rs. 88,611 having been sold to the public after meeting the requirements of the jail population. The total cash earnings for the year on jail industries amount to Rs. 2,27,381. The prisoners in Mandalay jail have been put on to grinding wheat for the requirements of the Police Department,

but this industry is worked at a remuneration which only returns a yield of one anna per prisoner employed per day, for whereas the cost of grinding 100 lbs. in the open market would be Rs. 2, the allowance for grinding 100 lbs. in the jail is only 8 annas. A textile expert has recently been appointed to advise the department with regard to looms, weaving and manufacture of cloth in general. The manufacture of bricks in different jails has proved a most profitable source of income. "As a business proposition.....the average cash profit per prisoner sentenced to labour was Rs. 14.7 in the year under report," whilst the prison labour supplied for the construction of the jail at Tharrawaddy is estimated at Rs. 1,00,167.

Turning to vital statistics, there was a slight increase in the sick and mortality rates. The death-rate was 14.58 per mille as against 10.30 in the previous year. Akyab jail reported an extremely high death-rate—58.20 per mille—attributed chiefly to the admission of elderly prisoners, many of them confirmed opium eaters. Malaria and dysentery were the two chief diseases concerned. Pulmonary tuberculosis figures high in the mortality rates of the jails recorded. A special tuberculosis ward exists at Myingyan jail; 60 patients in all were treated there during the year. Capt. Be Thaw, I.M.S., is singled out for mention on account of his special care and attention to the patients in this ward, and the results are good; 17 per cent. cured, and 12 per cent. of deaths—the latter chiefly from among prisoners admitted in an already advanced stage of the disease. Anæmia, pneumonia and diarrhoea are some of the other chief causes of morbidity in the jails under review; and no less than 7 deaths were recorded from diarrhoea (possibly due to infection with Flexner's bacillus) in Akyab jail.

The year was entirely free from beri-beri, a most notable event, despite the continuous overcrowding which occurred, a fact which tends to discredit the "contagious" theory with regard to this disease. Influenza was unimportant during the year; there was only one case of plague, also one of hydrophobia in a prisoner admitted after he had been bitten. Nearly 10 per cent. of prisoners admitted were habitual opium consumers.

Of the 263 deaths that occurred during the year, no less than 122 were amongst prisoners who had been less than six months in jail. These figures are eloquent of the debilitated state of health in which perhaps the majority of prisoners are admitted to jail. Residence in jail in fact means the death of those who are already severely diseased, but improves markedly the general state of health and nutrition of those in ordinary health.

Burma is pre-eminent in crime, and an interesting investigation into this problem by Mr. J. J. Beninson, I.C.S., was carried out during the year. In India, 626 persons per million are annually admitted to jail; in Burma the corresponding figure is 1,640. Proportionately six times as many persons per million are admitted to jail for theft in Burma as in the rest of India. Robbery and dacoity also appear to be very much more prevalent in Burma than in India. Also the proportion of habituals admitted in Burma is on the increase. Whereas an average of 68 per million young offenders under 21 years of age are admitted to jail per year in India, the proportion in Burma works out at no less than 283. It is clear that Burma shares with the United States of America the notoriety of being a criminal-ridden country.

Of other features in the report, emphasis is laid on the persistent overcrowding in the jails in the province during the year; the experimental employment of Burmans as warders and head-warders in two selected jails; an increase in the cash earnings; and the inauguration of a project to employ large bodies of prisoners on the ticket-of-leave scheme.

Col. Tarapore is to be congratulated on an extremely interesting report, which will be studied with much interest by all prison superintendents in India.

BENGAL PUBLIC HEALTH REPORT FOR THE YEAR 1926. BY DR. C. A. BENTLEY, M.B., D.P.H. CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT, 1928. PRICE, RS. 5.

THERE were several changes in the post of Director of Public Health, Bengal, during 1926. Dr. Bentley being on leave, Lieut.-Col. A. D. Stewart, I.M.S., acted until March 24th, when he also went on leave. Dr. R. B. Khambata succeeded him, and officiated until Dr. Bentley's return from leave on the 1st November, 1926.

The birth-rate per mille for the year, 27.4 per mille, was the smallest recorded from any province, though the death-rate—24.7 per mille—was seventh on the list of the ten provinces. The result is that the natural increase of population in Bengal—2.7 per mille—is almost less than half that of any other province, the Central Provinces leading the list with a figure of 11.7, and the Punjab coming next lowest to Bengal with a figure of 5.1. That this is a most unsatisfactory state of affairs does not need emphasising. The corrected rates, however, should be birth-rate 34.8 and death-rate 31.4 per mille, respectively.

The registration of vital occurrences in urban areas continues to be extremely unsatisfactory, and methods vary from one municipality to another, collecting sircars being employed in some, *dais* in others, rewards for reporting births and deaths being given in still others.

A graph on p. 9 shows how serious is the position with regard to the birth-rate in Bengal; even on the figures for the previous year the decline is 7.4 per cent. on the previous figure. Sixteen districts returned decreased birth-rates, and only 5 increased birth-rates; in Calcutta the rate was as low as 16.9. A still further factor in inaccuracy in reporting vital statistics is the failure of the courts to convict persons prosecuted under the Births and Deaths Registration Act; of 343 prosecutions undertaken, 59 were either withdrawn or struck off, whilst 81 municipalities did not prosecute a single offender.

The birth-rate in rural areas—28.1 per mille—was higher than that in towns—18.5 per mille. There was a slight improvement in the death-rate, perceptible in almost every district, except Calcutta and Howrah. With the exception of fevers, indeed, Calcutta shows a higher mortality from all other diseases than do the towns or rural areas, whilst anyone who has ever passed through that "salubrious locality" knows what a mass of slums constitutes Howrah.

Still-births in the province totalled 59,571. On an average 110 males die to every 100 females, and death-rates are higher among the Hindu and Mahomedan communities than amongst Christians and Buddhists. More than 50 per cent. of the total deaths occur in children of less than five years of age and persons above 50; only half the total mortality being in persons between the ages of 5 and 50 years. The death-rate is higher for females during the child-bearing period than for males of the same ages. The infant mortality rate was 196.8, an increase of 8.6 per cent. on the 1925 figures. The highest infantile death-rate is that recorded from Calcutta, a figure of no less than 372. In the rural towns the figure is better, 248.2, and in the rural *mofussil* areas better still, 194.4. Such figures show that, in spite of the vastly better facilities afforded in the big cities, such facilities cannot compete successfully with the growth of slums; registration, however, is much better in the cities than in the villages.

Cholera.—The year was characterised by a cholera epidemic, with 59,106 deaths and a death-rate 85.7 per cent. above that in 1925. The month of maximum incidence was, as usual, April. The quantity of cholera vaccine issued during the year was nearly five times that in 1925. As compared with only 16 districts in 1925, in 1926 inoculations were carried out in every district in the province with the exception of Darjeeling, where the disease is very rare. "It is satisfactory to note" runs the covering Government resolution "that

the inoculation is steadily gaining in popularity and has been universally admitted to be the best preventive of this fell disease. Besides, its immediate effects have captured the imagination of the public in a wonderful manner."

Small-pox.—The epidemic which started in 1924 continued into 1926, and persisted throughout the year, the total mortality from it being 25,548 as against a figure of 17,436 for 1925. The death-rate increased by 66.6 per cent. on the former figure, though the number of vaccinations showed a slight increase. As is not uncommon during an epidemic year the primary vaccinations decreased by a small percentage, whereas re-vaccinations increased by a large figure—20.1 per cent. The proportion of infants protected is only 273.4 per mille. In Calcutta, however, the corresponding figure is 500 per mille. The epidemic was at its height in May, and at its lowest in October, only to rise again towards December. Death-rates from small-pox were higher in all districts, except the Presidency district, in 1926 than in 1925. In some districts, such as Pabna, small-pox accounted for no less than 9 per cent. of the total mortality of the year. Half the total small-pox mortality was contributed by the six districts of Pabna, Murshidabad, Midnapur, 24-Parganas, Howrah and Burdwan.

Delayed notification was responsible for a severe outbreak which could not be stayed in Murshidabad district. The opposition of country *raids* and *kabirajs* to vaccination also militated against the control of the disease. In Calcutta and municipal areas it is reported that more than half the infants which had survived both the usual causes of infantile mortality and small-pox were protected.

Fevers.—The total mortality from "fevers" was 822,774, representing a ratio of 17.7 per mille. This mortality is highest in November and lowest in July. The increase in fever mortality seems to affect chiefly the western portion of the province, whilst there is a gradual decline in the death-rates from fevers in the towns and rural areas. Over 8,000 lbs. of quinine were distributed through the department during the year. Of experimental antimalarial schemes, the Banka Valley scheme had to struggle with an unexpected flooding by the river in August; the Singaran-Toposi scheme worked satisfactorily; the Jhangipur scheme has yielded excellent results since 1918—the spleen-rates having been materially reduced.

Kala-azar.—The total number of deaths reported—14,275 in all—showed a definite decline on the figure for 1925. Kala-azar accounts for only 1.7 per cent. of the fever mortality and 1.2 per cent. of the total mortality. Many centres report a falling off in attendances for treatment, and possibly the widespread measures now taken against the disease by official and voluntary agencies are beginning to tell.

Of other diseases, enteric fever showed a marked decline, but is definitely more prevalent in towns than in villages (perhaps owing to more accurate diagnosis in the former). Measles and relapsing fever were very unimportant; and there was no death from plague during the year in the province. Dysentery and diarrhoea accounted for a death-rate varying in different districts from 0.35 to 0.94 per mille of the population—figures which seem quite insignificant superficially, but which represent a big toll of life in the aggregate. Respiratory diseases accounted for a total death-rate of 0.66 per mille, or 30,589 deaths. Bites from snakes or attacks by wild animals accounted for 4,859 deaths and hydrophobia for only 349—a figure which shows how very unimportant hydrophobia is as a cause of death in the total mortality rate of India.

The public health laboratories continued to do a very big volume of routine work during the year, and published medical research papers which have already been commented on in our columns. One significant contrast is recorded in the table of samples examined. Of 535 samples of milk from the Carmichael Hospital for Tropical Diseases, which has an excellent milk supply, only 2 showed evidence of adulteration; of 283 samples from municipalities, no less than 166 or 58 per cent.

were adulterated. "Milk" is a very variable fluid in India and often a very different fluid from that yielded by the cow. In the School Hygiene Department 6,735 schoolboys were examined; only 15 per cent. are recorded as well nourished, 65 per cent. as fairly nourished, and 19 per cent. as ill nourished. Nearly 13 per cent. of children examined had defective teeth. Grants in aid were made to 100 training classes for *dais* in the province, and 1,094 village midwives received training during the year. The Publicity Officer of the department received a much needed assistant officer during the year. Some 300 lectures, attended by about 180,000 persons, were delivered during the year, 50 further sets of lantern slides prepared, and nearly a quarter of a million leaflets distributed. The department is equipped with 24 cinema reels on different diseases and aspects of public health, whilst its coloured posters have proved very popular. "The manner in which the work of this branch is developing and the pressing demand for such educative campaigns have once more made it incumbent on me to ask Government for sanction to conduct the work on a more extensive and intensive scale," writes Dr. Bentley.

The annual report of the Bengal Sanitary Board by F. C. Griffin, M. Inst. C.E., Chief Engineer, Public Health Department, Bengal, is also included in the volume. Twelve water-supply and drainage schemes were prepared and eight detailed projects of municipal water supplies and sewerage were drawn up during the year. Four water-supply and sewerage schemes were completed during the year, and others are in progress. Mr. G. Bransby Williams went on leave prior to retirement during the year, and "Government are confident that under Mr. Griffin the high standard of efficiency attained by the Engineering Branch of the Public Health Department will be fully upheld." With Mr. Bransby Williams' retirement, Calcutta loses a very efficient officer and a keen sanitarian.

FIFTY-SECOND ANNUAL REPORT OF THE CHEMICAL EXAMINER'S DEPARTMENT, BENGAL, FOR THE YEAR 1926. BY MAJOR T. C. BOYD, I.M.S., CHEMICAL EXAMINER TO THE GOVERNMENT OF BENGAL. CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT. PRICE, Rs. 1-4-0.

As usual, Major (now Lieut.-Col.) Boyd's report contains much of interest.

Dr. Hira Lal Sinha, B.A., I.M.S., was in charge of the Department until September 27th, 1926, when Major Boyd returned from leave and took over charge. The volume of work has steadily increased, from a total of 3,141 articles in 1921 to 7,021 in 1926. Of the latter, 4,006 articles were from Bengal, the rest being sent in by the provinces of Assam, Bihar and Orissa, the Central Government, or private firms, etc. The regulations for the Calcutta University M.B. examination having lately been thoroughly revised, this will involve increased work in teaching in the Department.

In the general analytical department, 2,296 examinations were carried out. Thirty-four water samples were examined. Of 50 samples of ghee tested, only 7 were found to conform to the standards laid down, and only 3 out of 11 samples of mustard oil. Other articles examined were samples of cocaine and opium, articles in connection with note forging and counterfeit coinage cases, and 211 examinations of explosive substances. The medical and scientific side of the department requires to be developed. Owing to the increase of work one of the store rooms was converted into an extra chemical laboratory during the year.

The following were some of the conundrums presented to the department during the year.

(1) As to the process of removing the hardness of tube-well water by subjecting it to the permutit system of softening.

(2) As to the existing tests for determination of the germicidal value of disinfectants.

(3) The question of the identification of pellets recovered from wounds.

(4) As to whether osmium tetroxide should be classed as a noxious and deleterious substance and fall under the Indian Post Office Act (No. VI of 1898) and also as to the advisability of its transmission through the foreign parcel post. (Referred by the Deputy Director-General of Posts and Telegraphs, Calcutta.)

(5) The question of toxicity in specimens of urea-stibamine which showed turbidity in solution. Further questions regarding toxicity of complex organic compounds will probably arise in the near future and can only be satisfactorily answered by the introduction of biological assay methods.

(6) As to whether there is any danger to human life in using potassium bromide as a substitute for potassium iodide. (Referred by the Commissioner of Police, Detective Department, Calcutta.)

(7) The cause of a solution of hydrarg. iodidum rubrum with potassium iodide turning black. (Referred by the Medical Store-keeper to Government, Calcutta.)

(8) The administration of a salt of copper as a possible abortifacient.

In the medico-legal department 2,212 cases were referred, an increase of no less than 316 on the figure for 1925. Of these, 1,192 came from Bengal, 849 from Bihar and Orissa, and 163 from Assam. The total number of articles examined was 4,725. Poison was detected in 168 out of 857 cases of suspected human poisoning, the most common poison being opium, followed by arsenic, oleander and aconite. In the majority of cases sent for analysis, the medical officers concerned withheld their opinion as to the cause of death. Poison was detected in 53 out of 108 cases of suspected animal poisoning, the chief poison used being arsenic. Blood was detected in 1,285 out of 1,917 articles examined, and proved to be human in 1,049 instances on examination by the Imperial Serologist. Seminal stains examined numbered 247.

Senior Assistant Surgeon Satyendra Nath Sen, M.B., contributes medico-legal notes to the report which show how important are the duties of the medico-legal department. Aconite was detected in the case of three persons who had drunk country *pachawai* together, and appears to be frequently introduced into country liquors in order to increase the drinker's thirst. Atropine is usually administered in sweetmeats. Cocaine was detected in a case from Bhagalpur, a district in which the cocaine habit appears to be common. In one instance a father poisoned his son and daughter, and then himself with potassium cyanide; whilst the same poison was detected in ten samples of whisky and brandy sent out as (forged) free presentation samples in Assam. Opium was detected in the viscera of a patient who was alleged to have died from snake-bite, and also in the viscera of two persons who were alleged to have died from hanging. Red lead, oleander and sulphur figure among the animal poisons detected. In a case stated to be one of rape, the blood present turned out to be that of a fowl (this appears to be a common procedure in India, the charge of rape being made, and the clothes stained with fowl's blood to simulate human blood.) Sulphuric acid in one case and hydrochloric acid in another were detected on mosquito nets; it is probable that these acids were thrown at the persons sleeping inside the nets.

The main feature of the year was the tremendous increase in the volume of work dealt with in every department. Captain J. K. Banerjee, M.B., was appointed temporarily as 5th Assistant Chemical Examiner during the year. Major Boyd laments the approaching retirement of Dr. Hira Lal Sinha, who for thirty years has rendered invaluable service in the Department. "The retirement of experienced officers is a serious matter to the satisfactory running of this Department," he writes, "and can only be met by a reorganisation scheme that will supply future assistant chemical examiners with the necessary practical experience as vacancies occur. Unless some such scheme is put into operation in the near future, it will be impossible to carry on the work, which is still expanding, without considerable delay, congestion and loss of efficiency."

THE CALCUTTA DENTAL COLLEGE AND HOSPITAL. ANNUAL REPORT FOR 1927-28. BY R. AHMED, D.D.S., PRINCIPAL.

This is the report on the seventh year's work of this institution, and the Principal is able to report that 54 past students are all practising as successful dentists in various parts of India, Burma, Siam and Ceylon. There were 38 students on the roll during the year, of whom 13 passed the final examination and received the diploma. The course of instruction lasts three years, and qualified medical practitioners who attend the College have now to attend for twelve, instead of nine, months as previously. The premises are sufficiently large for the present volume of work and number of students, but it is anticipated that they will soon become insufficient, if the work of the College continues to expand at its present rate.

During the year 2,987 out-patients were attended to, dental operations numbered 142, and there were 5,018 extractions, with much other work. The Secretary to the Local Self Government Department, Bengal, writes appreciatively of the work of the institution, and regrets that "had it not been for lack of funds, the Government of Bengal would have started a Dental College some time ago."

The audited balance sheet shows an income of Rs. 18,726, an expenditure of Rs. 13,283, and capital assets of value Rs. 13,204. Although it began in a humble way, the expansion of the work of the Calcutta Dental College shows how much an institution of the kind was needed in Calcutta.

ADMINISTRATION REPORT, STATISTICS AND PROFESSIONAL REPORT OF THE GOVERNMENT OPHTHALMIC HOSPITAL, MADRAS, FOR THE YEAR 1927. BY LIEUT.-COL. R. E. WRIGHT, B.A., M.D., D.P.H., I.M.S., SUPERINTENDENT. PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS, MADRAS. PRICE, As. 12.

The report of the Government Ophthalmic Hospital, Madras, for 1927, is a record of continued progress in this important department of medical science. The total number of in-patients treated was 4,208 as compared with 3,898 in 1926: the out-patient figures also show a rise namely 25,899 as compared with 23,412 in the previous year. Operations on in-patients numbered 3,376 and on out-patients 3,042: no fewer than 1,652 cases of senile cataract were dealt with by operative procedures. A considerable reduction is recorded in the incidence of complications following this operation and the figures compare favourably with those of any first class ophthalmic hospital in the West. The vitreous loss rate is down, reaching the low figure of 0.73 per cent. in the straightforward cases. The iris prolapse rate is just over 2.1 per cent. Late formation of the anterior chamber occurred in 2.7 per cent. of the cases. The more important serious post-operative complications and causes of failure were, primary infections 8, of which 1 went on to panophthalmitis, choroidal hæmorrhage 3, turned sections 3, fundus disease 10, and marked glaucoma before cataract operation 15.

In connection with the iris prolapse rate, Colonel Wright explains that the figure quoted in last year's report namely 8 per cent., was a mistake in recording. This percentage, as also that in 1925, included not only iris prolapses but also impactions and drawing up of the pillars of face of the iris to the back of the section. A careful check of the records by several members of the staff showed that the actual iris prolapse rate in 1926 was 2.8 per cent. It is of interest to note also that the vitreous loss rate for the past 15 years has remained somewhere between 1 and 3 per cent.

The most important factors influencing the prolapse rate are those which, if present either singly or collectively, determine the expectation of success as "bad."

They are:—

(1) Intractable behaviour on the part of the patients associated with violent squeezing, uncontrolled movements, post-operative tampering with the dressing, wandering about the hospital, etc.

(2) Abnormal states of the iris as determined by old uveitis, the flabby irides associated with intense anæmia, irides which have been rendered parietic by the delivery or other manipulation.

(3) Conditions which are likely to be associated with post-operative increase in volume of the posterior segment such as glaucomatous types of eyes, or vascular disturbances in which the volume of the posterior segment is altered by actual hæmorrhage or engorgement.

Attempts have been made to find out if the more intense heat and glare existing in some parts of India is associated with greater frequency in the incidence of cataract. There is a general impression that this is so, but it is difficult to prove. Blindness in the Madras Presidency appears to be most prevalent in Gaujam, Malabar and North Arcot. The climatic conditions in two of them, Malabar and North Arcot are widely divergent. (The conditions in Gaujam most nearly approach North Arcot, but it is more humid.) In Malabar one finds a damp, green, thickly forested area with heavy rainfall, whereas in North Arcot the country is of a dry, arid, almost desert type with scanty rain. Assuming that the frequency of blindness and the frequency of cataract bear a direct relationship one to the other in S. India, one might perhaps have expected a greater frequency of blindness in those areas in which there was a preponderance of glare and bright light, i.e., where an infra-red or thermal lesion might be assumed to predominate. For this assumption there is at the moment no proof, but whatever its ætiology cataract is one of the chief causes of blindness in the presidency so far as the census return "blind" is concerned. Analysis of the hospital figures also shows that cataract leads the list, being approximately ten times more frequent than the next most common blinding affections.

During the year under review an important piece of research was undertaken by Major Verdon in conjunction with Major Newcomb, viz., the investigation of the method of lowering intra-ocular tension by the intra-venous injection of hypertonic sodium chloride indicated by Duke Elder. Despite considerable technical difficulties interesting results were obtained, and these were embodied in a paper read before the Far Eastern Association of Tropical Medicine Seventh Congress, held in Calcutta in December, 1927. Major Verdon's conclusions may be summarised as follows:—

(1) Therapeutically the injection of strong sodium chloride solution is a valuable means of lowering the intra-ocular tension, effective in the great majority of cases and especially valuable as a pre-operative procedure.

(2) Following the injection, the intra-ocular tension falls and the osmotic pressure of the blood goes up, in spite of a large increase in blood volume, but it remains to be shown whether the fall in intra-ocular tension is more closely connected with the osmotic pressure or with other changes in the constitution of the blood.

During 1927, 2,416 cases were seen in the refraction room. Of these 1,980 were pure refraction cases, the great majority of which attended hospital for examination under a cycloplegic, and 436 were cases of fundus disease.

A series of models, specimens, photographs, charts, paintings, etc., from the hospital were on view in the ophthalmological section during the Congress of the Far Eastern Association of Tropical Medicine held in Calcutta in December, 1927. Those of us who were privileged to view the exhibit were unanimously of opinion that it constituted one of the most interesting and important contributions to the Congress.

During Colonel Wright's absence on leave for nine months, Major P. Verdon, I.M.S., officiated as Superintendent.

ANNUAL REPORT OF THE PRINCE OF WALES MEDICAL COLLEGE, PATNA, FOR THE YEAR 1926-27. BY MAJOR R. R. M. PORTER, I.M.S., OFFG. PRINCIPAL. SUPDT., GOVT. PRINTING, PATNA, B. & O. PRICE, As. 5.

THIS report shows the new Prince of Wales Medical College at Patna to be in a flourishing condition during

its second year of existence. Lieut.-Col. H. R. Dutton, I.M.S., was in charge of the College throughout the year, but left on leave in April, 1927, so that the present report is by Major Porter.

All departments were open during the year, and 76 students transferred from the Medical College, Calcutta, to Patna. Certain improvements were effected in the buildings, and certain changes occurred in the staff. Dr. E. W. H. Cruickshank, D.Sc. (Lond.), M.D. (Aberd.), M.R.C.P. (Lond.), joined the staff as Professor of Physiology during the year, and Major Porter succeeded Capt. S. N. Hayes, F.R.C.S., I.M.S., as Professor of Surgery. Forty students were admitted during the year, and 28 out of 38 who sat for the first M.B., B.S., passed. Twenty-two students appeared in the second M.B., B.S. of the Patna University, of whom 9 passed. Nine students appeared for the final M.B., B.S., of whom 6 passed (these were students who had been transferred from Calcutta to Patna). The College has not yet been recognised by the General Medical Council, but was visited during the year by Sir Norman Walker, as representative of that body for the purpose of inspection and report. Dr. W. S. Carter of the Rockefeller Foundation also visited the College during the year. The average daily attendance of students during the year was 164.6.

Owing to the vagaries of the Public Works' Department, the official opening of the College had to be delayed until the 25th February, 1927 (by which time it had been in existence as a teaching institution for some twenty months). The official opening was performed by H. E. Sir Henry Wheeler, on that date whilst several of the more prominent donors to the College were present.

Athletics played a prominent part in the life of the College during the year, football, tennis, and hockey being played regularly. Two country boats were purchased, and boating proved to be popular. The library now contains 1,033 books and 47 journals. The average cost of each student educated during the year was Rs. 1,844, and there are twenty-four scholarships awarded annually. Under the orders of Government, post-graduate classes for the training of Assistant Surgeons, lasting for three months, were opened during the year: 8 candidates attended and all passed the terminal examination. Twenty-four students were sent to Bangalore to receive training in midwifery. In the pathology department 20 new microscopes were purchased, and the grant for the establishment of a pathological museum fully expended. Sanction has been accorded by Government to the establishment of a provincial laboratory and of a provincial Pasteur Institute. The physiology department is still hampered by lack of space, assistants, and menials; whilst the post of biochemist, which has been sanctioned, has not yet been filled. The anatomical, biological, and pharmacological departments are now well equipped and in full running order, and an assistant surgeon was sent to the Medical College, Calcutta, for special training in museum work.

"The College is well equipped, but some augmentation of staff is necessary" writes Colonel Willmore, Inspector-General. "Proposals in this connection have been submitted to Government."

Correspondence.

THE RATIONALE OF MALARIA TREATMENT IN SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Malaria and many other forms of fever are beneficial in neuro-syphilitic conditions; an attack of kala-azar may improve a case of leprosy, while pneumonia has been known to effect a cure in kala-azar.

There is one factor in common to these conditions, viz., that the secondary (curative) disease principally attacks tissues which are hardly affected by the primary

disease. Thus G. P. I. and tabes are diseases of the central nervous system, a part of the body unaffected by benign tertian malaria; leprosy is a disease of skin and nerves, kala-azar usually attacks tissues other than these; kala-azar principally involves the spleen while pneumonia has its special focus in the lung.

May it not be that the curative disease acts by depressing other tissues so that the organisms, causing the primary condition, are lured thereunto to assail a weakened fortress, but a fortress where, fortunately for the patient, the organisms are themselves either destroyed or their activities rendered comparatively innocuous? The theory may at first sight appear far-fetched but the following evidence may be adduced in support of it:—

(1) Novarsenobillon, as is well known, is quite useless in G. P. I. and tabes, yet after malaria it is of undoubted value, suggesting that the spirochaetes which had been lurking in tissues inaccessible to the drug had migrated to tissues into which the novarsenobillon could penetrate.

(2) Malaria does not remove the Wassermann reaction, on the contrary it is said that in certain cases of G. P. I. the serums which previously had been negative were rendered positive after malarial treatment (neuro-syphilis tending to become generalised syphilis?).

(3) No other explanation so fits the facts for if the good be attributed to protein shock (the generally accepted view) or to high incompatible temperature, or to leucocytosis, the question arises why should malaria only be of use in neuro-syphilis, and not equally beneficial in all late forms of syphilis?

(4) In the words of MacNalty "It is a truism of medicine that a disease is prone to attack an individual at the weakest or most fatigued point of bodily resistance." The above "migration" theory might be considered a reasonable corollary of such a statement.

(5) The extreme rarity of neuro-syphilis in India suggests that the spirochaetes prefer to attack and remain in the weakest tissues. The Indian as a rule is a fatalist and does not worry over so trifling a disease as syphilis, moreover the climate, his inadequate diet, malaria, dysentery, and a host of other devitalising conditions tend to keep his bodily resistance at a very low ebb without, at the same time, throwing any extra strain on his central nervous system. In consequence he escapes such diseases as G. P. I. and tabes. With the European exactly the reverse holds good. He is a man of comparatively good physique but to him venereal disease spells disaster. Sleepless nights and anxious days throw all the strain on his central nervous system—"the most fatigued point of bodily resistance" becomes the site of selection of the spirochaetes and he falls a ready prey to para-syphilitic diseases.

(6) The fact that dermal leishmanoid would appear to be fairly common as a sequel to other diseases of the skin, again suggests that the weakened tissues of the body are most likely to be involved by disease-causing organisms migrating thereto. Thus the one history, recorded in full in Col. Knowles' Introduction to Medical Protozoology (Page 217), is a case of a Hindu male adult who was treated for kala-azar and discharged as clinically cured. Two years later he contracted syphilis followed by an extensive generalised secondary eruption of so severe a character that it simulated small-pox—after 1½ years he developed dermal leishmanoid.—Yours, etc.,

A. G. BROOKS.

PASTEUR INSTITUTE, KASAUJI.
17th July, 1928.

EYE-FLIES.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I am very glad to see an article on these flies by Dr. D. N. Roy in the *Indian Medical Gazette*, July 1928. The fly has been a pest in India ever since 1881 when I first went to the country. I am now writing merely to point out that the numbers of these flies often vary from place to place suggesting that they breed principally in certain substances, which are not found everywhere, or in certain localities. Thus when I was

in Ceylon two years ago they were very numerous in most of the planters' bungalows, but I observed that they were nearly absent from one such bungalow and should like to have found a reason for this but had no time to investigate. Natives have told me that they swarm largely round "jack fruit," but I am not sure of this. When I lived in Bangalore many years ago, one of my daughters, who was then a child, had an extremely severe attack of ophthalmia from which she fortunately recovered completely. We thought the infection had been carried by "eye-flies" as Professor Strickland and Dr. Roy have noticed.

I agreed that, in the interests of the public in India, the subject should be thoroughly investigated.—Yours, etc.,

RONALD ROSS.

THE ROSS INSTITUTE AND HOSPITAL FOR
TROPICAL DISEASES, PUTNEY HEATH,
LONDON.
30th July, 1928.

ANÆSTHESIA OF THE ABDOMEN.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Reference the first two complications mentioned in Colonel Brayne's and Dr. Sen Gupta's article on "Anæsthesia of the Abdomen" in your journal of July 1928, viz., (a) Headache and (b) Temperature, my experience is that the former can be avoided or minimised by putting the patient during operation and during the post-operative treatment in bed with the head low or lower than the rest of the body, and that the latter is due to absorption of blood and tissue proteins let loose in the area of operation by the knife.—Yours, etc.,

A. F. W. da COSTA, F.R.C.S., D.T.M., L.M. & S.,
Civil Surgeon.

BILASPUR, C. P.,
21st July, 1928.

SODIUM CACODYLATE IN THE TREATMENT OF BOILS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I shall be glad if you will be pleased to publish this note in your esteemed paper.

With reference to my paper in your *Gazette* of March 1928, on page 128, the dose generally used is gr. iii for an adult. I generally inject it subcutaneously. In my article I used the word hypodermic which I now understand is a loose term for both subcutaneous and intramuscular administration. Recently I have tried soamin and this gives me better results.—Yours, etc.,

BIDHU BHUSAN GHOSE, L.M.F.

SHAHAZADPUR,
PABNA DISTRICT.

COAGULATION OF THE PERITONEAL INFLAMMATORY EXUDATE.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—Some time ago I read in the *Indian Medical Gazette* that the fibrin of the peritoneal inflammatory exudate coagulates and causes adhesions within 24 hours after an injury. The following case illustrates that the adhesions can take place even earlier, i.e., within 14 hours.

A boy, aged 14, who fell from a jambul tree at 5 p.m. was brought to me at 7 a.m. next morning. A splinter of wood about ½ inch thick at the tip and ¼ inch behind entered the right side of his back just above the crest of the ilium about 3 inches from the spine, went through the abdomen and protruded 2 inches in the left groin just above the inferior spine of the left ilium. The protruded portion of the splinter was covered with faecal matter. The whole length of the splinter was 13 inches, 9 inches within the abdomen and 2 inches outside on either side. The abdomen was fully distended; no stool or flatus was passed; the urine was clear; there was no blood in it; temperature was

100°F.; pulse full and bounding, 100 per minute; respirations were normal.

Preparations were made for opening the abdomen and suturing the intestines where necessary. The protruded portion of the splinter was cut close to the skin and the remainder was withdrawn from the wound of entry at the back. Stinking gas gushed out with a noise and the abdomen completely subsided immediately. This proved that the punctured intestines were glued together and to the parietal peritoneum by the coagulation of the fibrin within 14 hours. Hence the gas in the intestines could not escape into the peritoneal cavity but was expelled outside. The wounds in the abdominal walls were simply dressed and bandaged. The boy made an uneventful recovery and was discharged cured in a week.—Yours, etc.,

K. V. KUBAL,
Medical Officer.

CHINCHANI, BOMBAY,
23rd June, 1928.

ESTIMATION OF CHLORINE IN BLEACHING POWDER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—I beg the hospitality of your column for inserting the following observations which I would like to make upon the paper, "A simple method for estimating the available chlorine in bleaching powder" by Dr. R. B. Brahmachari, published in the *Indian Medical Gazette* in May 1927, Vol. LXII, No. 5, p. 251.

The method described in the paper is only an adaptation of the original method of Pinot (*vide Quantitative Analysis* by Clowes and Colmen, 11th Ed., page 162). It gives only the approximate amount of chlorine, as the amount of arsenious oxide prescribed is 10 grains instead of the theoretical amount of 9.75 grains to be dissolved in 16 ounces of water. The amount of soda carbonate given is 40 grs. This is, however, insufficient to dissolve the amount of arsenious oxide. It should be at least 50 grains, if not more.

The method is open to criticism on the following grounds:—(1) An ordinary mill doctor for whom this is intended, if he has no previous experience, will find it rather disconcerting to prepare the standard arsenic solution as described in the paper, as it has been found in the laboratory that it requires at least 2 hours' continuous digestion on the steam-bath to dissolve the amount of arsenious oxide in the alkaline solution. (2) The solution of arsenious oxide is highly poisonous and as such it cannot be entrusted to a layman. A better method of preparing starch solution is to make an emulsion of starch with cold water first and then to pour this into boiling water, as experienced in the laboratory has shown that if starch is heated at first with water to boiling point it more often than not happens that the test-tube cracks.

The method can be simplified still further. Instead of taking 6 test-tubes and putting 1 c.cm. of the arsenic solution in each tube, one 10 c.cms. graduated pipette and one test-tube only with 1 c.c. of the solution and a measure glass are all that is necessary for the test. Add 5 c.cms. of water and a few cubic centimetres of starch solution and a small crystal of potassium iodide to the test-tube. From the graduated pipette go on running the bleach solution gradually until the contents of the test-tube begin to turn blue. The amount of the bleach solution run in will give the accurate amount of chlorine instead of its possible range of values, according to the paper. The method of calculation will, of course, remain the same. The starch potassium iodide in this case can be used as an internal indicator in contrast to the original method of Pinot where this is to be used as an external indicator in the form of iodised starch paper.—Yours, etc.,

N. L. BANERJEE,
*Asst. Professor, School of Tropical
Medicine and Hygiene.*

CALCUTTA,
24th August, 1928.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Lieutenant-Colonel E. W. C. Bradfield, C.I.E., O.B.E., M.B., F.R.C.S.E., I.M.S., First Surgeon and Superintendent, Government General Hospital, and Professor of Surgery, Medical College, Madras, is appointed to officiate temporarily as Surgeon-General with the Government of Madras in addition to his own duties, with effect from the afternoon of the 2nd August, 1928, and until further orders.

The services of Lieutenant-Colonel H. W. Acton, I.M.S., and Lieutenant-Colonel R. Knowles, I.M.S., are placed permanently at the disposal of the Government of Bengal, with effect from the 16th August, 1928, from which date they will cease to be members of the Medical Research Department.

Lieutenant-Colonel W. J. Simpson, I.M.S., an Agency Surgeon, on return from leave, is posted as Agency Surgeon, Bhopal, with effect from the 11th August, 1928.

The services of Lieutenant-Colonel I. M. Macrae, O.B.E., M.B., I.M.S., are placed at the disposal of the Government of Bihar and Orissa for employment as Inspector-General of Prisons, with effect from the 17th February, 1926.

Major R. L. Vance, I.M.S., an Officiating Agency Surgeon, is posted as Civil Surgeon, Quetta, with effect from the 1st August, 1928.

The services of Major J. P. Huban, O.B.E., I.M.S., an Officiating Agency Surgeon, are placed at the disposal of the Chief Commissioner, Delhi.

Major B. H. Singh, M.C., I.M.S., First Resident Medical Officer, Eden Hospital, Calcutta, is appointed temporarily to be the wholtime Resident Physician, Medical College Hospitals, Calcutta.

Major C. J. Stocker, M.C., M.D., I.M.S., Civil Surgeon, Pachmarhi, is re-posted to his former appointment as Civil Surgeon, Hoshangabad.

Major J. B. Hance, O.B.E., I.M.S., an Agency Surgeon, on return from leave, is posted as Chief Medical Officer, Western India States Agency and Residency Surgeon, Rajkot, with effect from the 22nd July, 1928.

The services of Captain R. T. Advani, I.M.S., are placed at the disposal of the Government of Bihar and Orissa for employment in the Jails Department, with effect from the date on which he assumes charge of his duties.

The orders regarding the appointment of Captain R. W. H. Miller, I.M.S., temporarily to the Medical Research Department and his posting as Supernumerary Officer to the Central Research Institute, Kasauli, have been cancelled.

The services of Captain M. A. Jafarey, I.M.S., are placed at the disposal of the Government of Burma for employment in the Jail Department, with effect from the date on which he assumes charge of his duties.

The King has approved the following appointments to permanent commissions in the Indian Medical Service, with effect from the dates specified:—

To be Captain (on probation).

Sydney Hartley, M.C., M.B., 30th April, 1928, with seniority 28th August, 1926.

To be Lieutenants (on probation).

Bijeta Chaudhuri, 2nd August, 1927.

Shankar Sahai Bhatnagar, 2nd August, 1927.

Charles Frederick John Cropper, 8th February, 1928.

Kenneth Hugh Athelsten Gross, M.C., 16th February, 1928, with seniority 26th July, 1926.

Everard Venn Claydon, 16th February, 1928, with seniority 20th December, 1927.

Victor Henry Sarland, M.B., 16th February, 1928.

John Acheson, M.B., 30th April, 1928, with seniority 24th June, 1925.

Edmund Aloysius O'Connor, M.B., 30th April, 1928.
John Patrick Joseph Little, M.B., 30th April, 1928.
Patrick Laurence O'Neill, 30th April, 1928.
Vincent Thomas Joseph Lynch, 30th April, 1928.

PROMOTIONS.

Subject to His Majesty's approval, the following promotions are made, with effect from the 7th July, 1928.
vice Major-General A. A. Gibbs, K.H.P., I.M.S., retired:—

Colonel to be Major-General.

Colonel H. Boulton, C.B., C.B.E., M.D., V.H.S., I.M.S.,

Lieutenant-Colonel to be Colonel.

Lieutenant-Colonel James Fuller-Good, M.B., I.M.S.
His Majesty the King has approved the under-mentioned promotion, with effect from the 1st July, 1928:—

To be Brevet Colonel.

Lieutenant-Colonel E. A. Walker, M.B., F.R.C.S.E., I.M.S.

Majors to be Lieutenant-Colonels.

W. D. Keyworth, M.B. Dated 30th July, 1928.
B. Gale, M.B. Dated 30th July, 1928.
H. H. King, M.B. Dated 30th July, 1928.
R. E. Flowerdew, M.B. Dated 30th July, 1928.
A. J. Symes, M.B. Dated 1st August, 1928.

Captains to be Majors.

H. H. Elliot, M.B.E., M.C., M.B., F.R.C.S.E. Dated 5th April, 1928.
A. C. Craighead, M.B. Dated 9th August, 1928.
G. R. Oberai, M.B. Dated 19th August, 1928.
I. Chandra, M.B. Dated 21st August, 1928.
P. H. S. Smith, M.B. Dated 30th August, 1928.
H. J. H. Symons, M.C. Dated 31st August, 1928.
The following provisional promotion is made, subject to His Majesty's approval:—

Lieutenant to be Captain.

B. S. Nat, M.B., F.R.C.S., I.M.S. Dated 2nd May, 1928.

RETIREMENTS.

Major-General A. A. Gibbs, K.H.P., 7th July, 1928.
Lieutenant-Colonel H. Watts, M.B., on account of ill-health, 10th May, 1928.
Lieutenant-Colonel W. Lapsley, O.B.E., M.B., on account of ill-health, 24th July, 1928.
Lieutenant-Colonel G. O. F. Sealy, I.M.S., with effect from the 22nd April, 1928.
Lieutenant-Colonel F. W. Browne, I.M.S., with effect from the 16th July, 1928.
Lieutenant-Colonel A. Murphy, 27th June, 1928.
Major A. Seddon, M.B. (on account of ill-health), 8th March, 1928.

LEAVE.

Major-General F. H. G. Hutchinson, C.I.E., M.B., K.H.S., I.M.S., Surgeon-General with the Government of Madras, is granted, preparatory to retirement, leave on average pay for eight months, combined with leave on half average pay for twenty months, with effect from the 2nd August, 1928, or from such subsequent date as he may avail himself of it.

Lieutenant-Colonel D. P. Gail, I.M.S., Civil Surgeon, Howrah, is granted leave on average pay for one month and fifteen days, with effect from the 3rd September, 1928.

Major G. H. Mahony, I.M.S., is granted leave on average pay for five months, with effect from the 21st May, 1928.

Major M. J. Holgate, I.M.S., Civil Surgeon, Hyderabad, is granted leave on average pay for eight months, followed by leave on half average pay for four months, with effect from the 25th October, 1928, or date of availing.

MISCELLANEOUS.

Subject to His Majesty's approval and in supersession of all previous notifications, the undermentioned officers will be graded for seniority as shown below:—

Names.	Pension service to count from.	Date of rank as Captain.
W. E. R. Dimond ..	26-7-1916	26-7-1919
P. H. S. Smith, M.B. ..	30-8-1916	30-8-1919.
H. H. Elliot, M.B.E., M.C., M.B., F.R.C.S.E. ..	5-10-1916	5-10-1919.
R. S. Aspinall ..	19-4-1917	19-4-1920
P. M. Antia, M.B. ..	23-5-1917	23-5-1920
S. N. Hayes, F.R.C.S. ..	9-3-1918	9-3-1921.
G. H. Fraser ..	25-11-1919	25-11-1922
A. H. Craig, M.B. (Service for promotion from 23rd June, 1920.) ..	29-11-1919	23-6-1923
R. W. H. Muller, M.B. ..	9-4-1920	9-4-1923
P. A. C. Devenport ..	22-4-1920	22-4-1923.
D. P. Bhargava, M.B., F.R.C.S.E. ..	5-6-1920	5-6-1923.
R. McRobert, M.B. ..	10-6-1921	10-6-1924.
T. A. Doran, M.B. (Service for promotion from 22nd May, 1922.) ..	28-1-1922	22-5-1925
S. C. H. Worseldine. (Service for promotion from 14th April, 1924.) ..	27-2-1923	14-4-1927

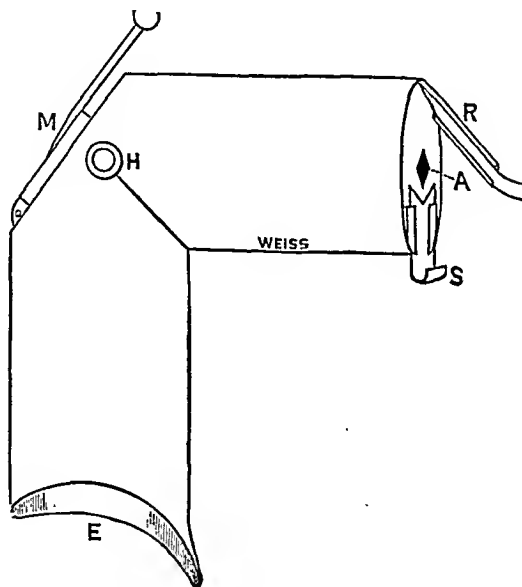
NOTES.

AN INSTRUMENT DESIGNED TO FACILITATE THE FIELDS OF VISION WHERE THERE IS A CENTRAL SCOTOMA.

(Abstract of paper read at the Ophthalmological Society of the U. K. by N. Bishop Harman.)

FIELD-taking is difficult where the macula of one eye is out of action. The device shown gets over most of these difficulties.

•A tube is bent at a right-angle midway in its length, and the two arms are so arranged as to give the seeing eye a false fixation spot which will correspond in position to the real one marked on the perimeter or scotometer.



The figure shows the plan of the instrument in reduced scale. E is the eyepiece. At the knuckle there is a double circle marked H, for the reception of the handle. At the extreme right hand end of the tube is a plate, in the centre of which is cut a diamond-shaped

aperture. At the knuckle of the bend of the tube is a large hole covered with a hinged lid M, fitted inside with a plane mirror.

The patient holds the instrument before the eye which has fixation power. He sees the patch of light reflected from the mirror lid at the knuckle. The field of vision of the other eye and the scotomata are thereon mapped out. The instrument can be used for either eye.

The Scotograph is made by Messrs. Weiss. It is shown with the handle for holding in the hand of the patient, and this is the form generally preferred, but the makers are prepared to fit it with a crank arm to clip on to the upright of the perimeter.

MESSRS. H. K. LEWIS & CO., LTD.

MESSRS. H. K. LEWIS & Co., 28 Gower Place, London, have just issued a small pamphlet describing their various "services." Messrs. Lewis & Co., has now been in existence for 84 years. The student visiting London will be well repaid by spending a short time in this shop. One of the most outstanding features is their most excellent lending library.

"VAPOROLE" BRAND EPHEDRINE SPRAY COMPOUND.

MESSRS. BURROUGHS WELLCOME & Co., have issued a useful "Vaporole" preparation of ephedrine for application to the pharynx and nose by means of an atomiser. "Vaporole" Ephedrine Spray Compound consists of Ephedrine 1 per cent. Menthol, Camphor and Oil of Thyme of each 2 per cent. in a base of "Paroleine" (a high quality liquid paraffin). Such a spray enables ephedrine to be efficiently applied locally in hay-fever and congested conditions of the pharynx and nasal mucosa. It is stated that clinical trials of this new method are exceedingly satisfactory and promise to provide a very effective weapon for the symptomatic relief of hay-fever and of engorged and catarrhal conditions of the naso-pharynx. The product is supplied in 1-oz. bottles.

EPIDIDYMITIS.

EPIDIDYMITIS, in the opinion of A. L. Wolbarst, M.D., ("Gonococcal Infection in the Male") is, by far, the most frequent complication of gonorrhoea and of paramount importance sociologically, because of its remote consequences.

Acute epididymitis is usually accompanied by inflammation of the vas deferens of the affected side or by an inflammation of the corresponding testis or by both. There is tense swelling of the epididymis, and, not rarely associated inflammation with serous exudation in the tunica vaginalis. Occasionally, the pain in the vas is quite severe and radiates upward and backward through the inguinal ring to the seminal vesicles, which share in the inflammatory process. This referred pain may lead to the erroneous diagnosis of acute appendicitis.

Acute epididymitis should be treated by rest (physical and sexual) and elevation of the scrotum and the constant application of heat Diathermy, according to Dr. C. Otis Rich ("Diathermy in Acute Epididymitis," Illinois Medical Journal) yields results which vary "from the most spectacular improvement to frank disappointment." Heat in the form of antiphlogistine dressings usually gives marked relief in these painful conditions. Thermotherapy with the aid of this endermic, bacteriostatic agent is essentially decongestive and relaxant, removing thereby the tension on the inflamed cord, at the same time preventing blood stasis in the affected area. Being plastic, adhesive, non-irritating and thermogenetic, the physician will find in antiphlogistine a distinctly convenient method for prolonged thermotherapy with complete absence of tissue irritation or toxic action.

REDUCTIONS IN THE PRICES OF STOVARSOL AND NOVARSENOBILLON (N.A.B.)

MAY & BAKER LIMITED, beg to draw attention to the considerable reductions which have recently taken place in the prices of the above two products.

For the convenience of Medical Practitioners and hospitals, large stocks of N.A.B. and Stovarsol are now carried at May & Baker's Indian Branches and Agencies established in the following centres:

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BOVRIL, LIMITED.

The 31st Annual Meeting of Bovril, Limited, was held in London, on 21st February.

Sir George Lawson Johnston (Chairman) said the profits for the year were £360,523. The same dividends were being paid as in the previous year, and £64,507 had been added to the reserve, bringing that up to £1,100,000. He added that not only had Bovril sales for the year broken all previous records, but that the actual increase in the 1927 sales over those of 1926 had been greater than in any year since 1921.

Every year since the War, their export sales had shown an increase over the previous year, and 1927 was no exception; again they had surpassed the previous records.

The Bovril Australian Estates, some 9,000,000 acres in extent, were situated in Northern Australia, over 1,500 miles from a big city.

The recently reported break-up of the drought would come as a great relief to those who had retained a good part of their stock, as no country could revive more rapidly than Australia, once given rain.

The remoteness of cattle from their final consuming market had even more to do with price than quality. Last season they sent a good portion of the Bovril Australian Estates steers to the West Australian Government works, and the price received for them was just about the price they received for a hide (taken off a steer of similar weight) at their factory in the Argentine; yet the price paid for butcher cattle in Melbourne or Sydney was quite as high as that paid by butchers for cattle in large Argentine cities.

They had ordered another river cattle carrier from Messrs. Thornycroft. It would take about 700 head and was to go out under its own motor power. From the cattle's point of view, it would be *de luxe*, with electric light, fans, water sprinklers for cooling the stock in hot weather, and it was, of course, fitted with drinking-water troughs. Not only did these things add to the animal's comfort, but they delivered him in better condition. He took that opportunity of confessing that they were paying more for this boat because it was British built throughout. If they had accepted even the engines from the Continent, instead of having a British make of semi-Diesel put in, they could, on those alone, have saved over £1,000; but in addition to being patriotic, the British article was he believed, worth while.

In proposing the election of the Duke of Atholl, Sir James Crichton-Browne said that there was one feature in the Report presented to them to-day which must, he thought, gratify them, not only from the shareholders' but from the patriotic and philanthropic point of view, and that was the record of the largely increased sales of Bovril, which was therefore contributing to that improved food supply of the people, which the Chief Medical Officer of the Ministry of Health declared to be the first essential in building up and maintaining the physique and stamina of the nation, and in increasing the resistance to disease. It was certain, Sir George Newman had said, that the most important factor in the decline of the death-rate from tuberculosis and some other diseases had been the rising standard in national nutrition.

Bovril was a factor in national nutrition, and so universal was now its consumption that it might almost be said to have become part of the British Constitution, while in the Dominions beyond the seas and in foreign countries it had established its reputation. Three thousand medical men from all parts of the country witnessed the making of Bovril in every stage, in October last, and they had since received from many of them emphatic testimony of their appreciation of the scrupulous care exercised in its production, and of the assistance it rendered them in their practice.

THE "ARTSUN" ULTRA-VIOLET RAY LAMP.

A NEW ultra-violet ray lamp at a very reasonable price £4 17s. 6d.—is the "Artsun" lamp manufactured by Brodie, Oakley and Co., 94, Gray's Inn Road, London, W. C. 1. Special features of this lamp are claimed to be: (a) the placing of the resistance behind the arc, in order that the infra-red rays generated thereby shall assist the deeper penetration of the ultra-violet rays; and (b) the co-ordination of all moving parts in a single adjustment. It is claimed that the special carbons supplied will last for approximately four hours, and will burn for twelve to fifteen minutes without adjustment. The lamp is suitable for either alternating or direct current.

The manufacturers state that they will be glad to supply further particulars.

THE SWINEY PRIZE FOR WORK ON MEDICAL JURISPRUDENCE OF THE ROYAL SOCIETY OF ARTS.

We are asked to give publicity to the following notice with regard to this prize of value £100, together with a cup of equivalent value. It has been in existence ever since 1849. India is the land of medical jurisprudence, and some of our readers may be interested to know of the prize.

The Council of the Royal Society of Arts give notice that the next award of the Swiney prize will be in January 1929, the eighty-fifth anniversary of the testator's death. Dr. Swiney died in 1844, and in his will left the sum of £5,000 Consols to the Royal Society of Arts, for the purpose of presenting a prize, on every fifth anniversary of his death, to the author of the best published work on Jurisprudence. The prize is a cup, value £100, and money to the same amount.

The award is made jointly by the Royal Society of Arts and the Royal College of Physicians, and the prize is offered alternately for Medical and General Jurisprudence. If at any time the Joint Committee of the Royal Society of Arts and the Royal College of Physicians, which is appointed to submit a book to the adjudicators, is unable to find a work of sufficient merit in the class whose turn it is to receive the award, the Committee is at liberty to recommend a book belonging to the other class.

On the last occasion of the award, in 1924, the prize was awarded for General Jurisprudence. It will, therefore, be offered on the present occasion for a work on Medical Jurisprudence.

Any person desiring to submit a work in the competition, or to recommend any work for the consideration of the judges, should do so by letter, addressed to the Secretary of the Society, John Street, Adelphi, W. C. 2, not later than November 30th, 1928.

A SIMPLE APPARATUS FOR THE ESTIMATION OF BLOOD-SUGAR.

IN our issue for February 1928, there was described by Dr. J. P. Bose, Mitra Research Scholar in Diabetes, Calcutta School of Tropical Medicine, a simplified method and apparatus for the estimation of the blood-sugar in cases of diabetes. The method is very simple and gives results accurate enough for all clinical purposes, whilst no special laboratory training or technical skill is required to carry out the test, which can be

performed by any general practitioner in about half-an-hour.

It is to be regretted that many medical practitioners, even in big cities like Calcutta, treat their diabetes patients without even a preliminary blood-sugar test, which is often injudicious, if not dangerous. The whole modern treatment of diabetes turns upon estimation of the blood-sugar. Dr. Bose's apparatus places in the hands of general practitioners, and especially of those in the *mofussil*, a ready means for carrying out the test.

The Bengal Chemical and Pharmaceutical Works, Ltd., 15, College Square, Calcutta, have now undertaken to put the apparatus on the market, conveniently packed in a small portable cabinet. Full particulars with regard to it may be obtained from them.

THE HOLWAY DUAL CONTROL UNIT FOR RAPID RADIOGRAPHY.

THE busy radiologist may have often felt the want of some method of photographing instantly any abnormal condition which he sees on the fluorescent screen. When this is the case, he usually has to suspend his examination, whilst attending to the setting of his controls, in order to produce the radiographic current required, only to find when he studies the finished radiograph that the particular condition which he wishes to demonstrate is not apparent, such as e.g., a filling defect in the duodenum.

In order to give the radiologist an apparatus which is instantaneous, Messrs. Newton and Wright, Ltd., 471-472, Hornsey Road, London, N. 19, have put on the market the "Holway" Dual Control Unit, suggestions with regard to which had been made to them by Dr. H. C. Gage of St. Mary's Hospital, Paddington. The apparatus consists essentially of two main parts: (a) the floor pedestal and foot controls, and (b) the attachments to the vertical screening stand for speedily placing the sensitive film in position during exposures.

The method of operation is as follows:—The controls on the main switch-board are adjusted so that the necessary current, say 60 milliamperes at 85 kilovolts, is produced through the tube. These controls are then left untouched; the patient is placed in position in the screening stands, the cassettes are loaded into the cassette-holder, and adjustment made on the dual control unit for the screening current, say of 3 to 5 milliamperes, as desired. Visual examination is now carried out, but exposure is made by depressing the "fluoroscopy" foot control instead of the usual hand-operated switch.

Immediately any abnormal condition is observed on the screen one of the cassettes in part (b), is instantaneously slipped into position, and the exposure made by depressing the "radiography" control, when the full exposure current is passed through the tube.

Provision is made in the foot control to close the filament circuit at the higher value before the high tension current is applied to the tube. The apparatus can be used in conjunction with almost any type of existing x-ray plant, and the two units (a) and (b) may be employed, if so desired.

The dual foot control (a) is listed at £25, and the photographic attachment with two half-plate cassettes and intensifying screens at £14-10-0.

THE ICHTHYOL FORMULARY.

ICHTHYOL is to-day a very well-known preparation. According to Squire it is a reddish-brown, syrupy liquid, obtained by the action of sulphuric acid on a sulphur-containing mineral oil distilled from peculiar fossil deposits, principally fish, and subsequently neutralised with ammonia.

Whatever its queer origin, ichthyol is used the world over by prescribing physicians, especially in the treatment of such conditions as chronic eczema, psoriasis, chronic rheumatism, pruritus and prurigo, and even in chilblains, and has come into very general use. It is

also administered internally in pulmonary tuberculosis and other conditions.

The manufacturers of ichthyol, the Ichthyol-Gesellschaft Cordes, Hermani and Co., Hamburg, have recently published a small brochure, entitled "The Ichthyol Formulary," which contains some 350 selected prescriptions of well-known authorities in which ichthyol is incorporated. Copies of this are available in India from R. Krishnaswami, P. O. Box 621, Bombay, Indian agents for the ichthyol manufacturers.

In addition to the original ichthyol, two other interesting preparations of the same firm are (a) Ichthargan. This is stated to be a compound of ichthyol with silver, and is especially indicated in the irrigation treatment of gonorrhoea, also in gynaecological practice generally. (b) Ichthoform. This is stated to be a product of the reaction of ichthyol with formic aldehyde, and is a blackish-brown powder, almost tasteless, insoluble in ordinary solvents, but intended for oral administration, when it is stated to be soluble in the alkaline contents of the small intestine. It is indicated especially in the treatment of tuberculous enteritis, and also in cutic fever.

"NEOSTAM" STIBAMINE GLUCOSIDE.

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"NEOSTAM" is a new compound of antimony originated and issued by Burroughs Wellcome & Co., for the treatment of kala-azar and other conditions where tartar-emetic has hitherto been used. The toxicity of "Neostam" is one-twentieth that of sodium antimony tartrate. (1) The results of clinical trials which have been reported suggest that it is a therapeutic agent of great value in kala-azar. (2) "Neostam" is administered by intravenous injection in the form of a four per cent. solution in water. The period of sterilisation averages a month, and the total quantity of "Neostam" necessary for a complete cure approximates 4 grammes per 100 lb. of body-weight.

Amongst other diseases which suggest themselves for treatment with "Neostam" are oriental sore, bilharziasis and filariasis.

"Neostam" is issued in hermetically-sealed phials of 0.05 gm., 0.1 gm., 0.2 gm., 0.5 gm. and 1 gm.

REFERENCES.

(1) Fargher and Gray, 1921. *Jour. Pharm. & Exper. Therap.* Vol. 18, page 331.

(2) *Indian Journal of Medical Research*, 1925, 12, page 679.

Indian Medical Gazette, January 1925, page 25.

China Medical Journal, January, 1927, page 21.

Journal of State Medicine, October 1927, Volume XXXV, No. 10, page 591.

ANTI-GAS-GANGRENE SERUM.

AFTER the Great War it seemed as if the need for anti-gas-gangrene serum was at an end. But, thanks to a brilliant series of experiments continued over two years by an English physician at one of the great London hospitals, a wide field of application has been opened and the importance of this serum is fully recognised. The serum for the original researches was supplied by the Wellcome Physiological Research Laboratories. The product which is now issued for use by the medical profession is described as "Wellcome" Anti-Gas-Gangrene Serum (W) (*B. welchii*).

"Wellcome" Anti-Gas-Gangrene Serum has been successfully used in abdominal surgery for the treatment of toxæmia of acute obstruction and peritonitis with ileus; in certain cases of puerperal septicæmia following abortion; and as a prophylactic in grossly infected wounds such as may occur in road accidents. From 40 c.c. to 100 c.c. of the unconcentrated serum (containing approximately 100 "W" units of anti-toxin per c.c.) are generally given intravenously or intramuscularly for the treatment and 10 c.c. to 20 c.c. for prophylaxis; of concentrated serum from 20 c.c. to 50 c.c. (containing approximately 500 "W2" units per c.c.) are given intravenously to severe cases and in

smaller quantities intravenously or intramuscularly to cases of moderate severity. The serum in experiments is found to protect against both toxin and living culture.

The unconcentrated serum hitherto issued has contained 60 "W" units and upwards per c.c. Concentrated serum has now been prepared and shortly will be available in large quantities. A dose of 10 c.c. of the concentrated serum will be equivalent to from 50 c.c. to 80 c.c. of the unconcentrated serum previously used.

"Wellcome" Anti-Gas-Gangrene Serum (W) (*B. welchii*) is an all-British product prepared at the Wellcome Physiological Research Laboratories, Beckenham, England, and issued by Burroughs Wellcome & Co. in 10 c.c. and 25 c.c. hermetically sealed phials.

THE TREATMENT OF SCIATICA.

THE term sciatica denotes an inflammation of the interstitial tissue of the sciatic nerve or its roots. Dr. J. P. Martin, M.D., M.R.C.P., writing in the *Lancet* indicates four or five methods which may give early and rapid relief, if not complete cure, the choice depending on the severity and on the stage of the ailment. These are: (a) electrical methods; (b) use of oxygen; (c) injection of saline; (d) epidural injection of antipyrin; (e) surgical methods. With all of these methods, the general principles which govern the treatment of inflammatory conditions must be practised.

The patient must be kept at rest in bed and heat in some form should be applied to the affected limb. John H. Anderson, M.D., C.M.G. (*Lancet*, April, 1927), maintains that in this condition "heat is always grateful, either as a poultice, hot bricks or sandbags, radiant heat, antiphlogistine, hot air baths, or the humble hot-water bottle." In view of the fact that its active ingredients are readily absorbed, antiphlogistine has a favourable effect on the inflammation in the fibrous tissues, and by penetrating among them and loosening them it separates small inflamed surfaces and breaks down many minute adhesions.

As for the general treatment, in the early stage the first essential is, with the aid of simple hypnotics, to secure sufficient sleep for the patient, in order that he may not become exhausted. As soon as the acute phase has subsided the patient should have a general tonic. Debilitating factors such as infective foci, glycosuria or albuminuria should be sought for and constipation carefully treated. If the patient has pyorrhoea the extraction of the teeth is to be recommended at this time.

Publishers' Notice.

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles will receive 25 reprints *gratis*, if asked for at the time of submitting their manuscripts.

Communications on Editorial Matters, Articles, Letters and Books for Review should be addressed to THE EDITOR, *The Indian Medical Gazette*, c/o The Calcutta School of Tropical Medicine, Central Avenue, Calcutta.

Communications for the Publishers relating to Subscriptions, Advertisements, and Reprints should be addressed to THE PUBLISHERS, Messrs. Thacker, Spink & Co., P. O. Box No. 54, Calcutta.

Annual Subscription to The Indian Medical Gazette, Rs. 16 including postage, in India. Rs. 18 including postage, abroad.

Papers and articles forwarded for publication are understood to be offered to *The Indian Medical Gazette* alone, and any breach of this rule will be followed by non-publication.

The Editors of *The Indian Medical Gazette* cannot advise correspondents with regard to prescriptions, diagnosis, etc., nor can they recommend individual practitioners by name, as any such action would constitute a breach of professional etiquette.

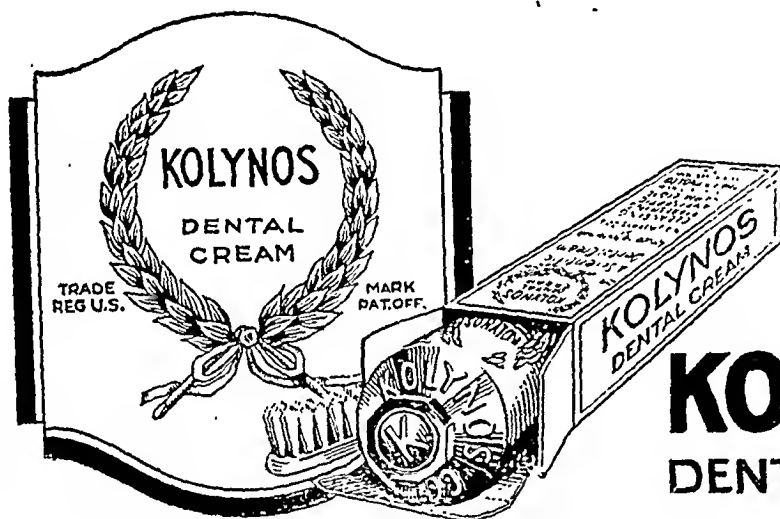
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FACSIMILE OF A LETTER RECEIVED FROM
MAJOR-GENERAL G. TATE, M.D., K.H.S., I.M.S., SURGEON-GENERAL
WITH THE GOVERNMENT OF BENGAL.

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ADDRESS: HEAD OFFICE.

The 7th January, 1928.

Messrs. Bengal Immunity Co., Ltd.,
153, Dharamtollah Street, CALCUTTA.

Dear Sir,

On behalf of our Local Committee, I beg to thank your firm for their assistance during the Far Eastern Association of Tropical Medicine 7th Congress just concluded. The demonstrations at your laboratories were very much appreciated by the members who attended, who had an opportunity of seeing what local enterprise could do in biological research and production.

Yours faithfully,

(Sd.) G. TATE,

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Surgeon-General with the Government of Bengal.

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Original Articles.

A PLEA FOR VAGINAL HYSTERECTOMY IN INDIA: ITS INDICATIONS AND TECHNIQUE.

A RECORD OF 150 CONSECUTIVE CASES.

By V. B. GREEN-ARMYTAGE, M.D., F.R.C.P. (Lond.),
Lieut.-Col. I.M.S.,

Professor of Gynaecology and Obstetrics, Medical College, Calcutta, and Surgeon to the Eden Hospital.

WHEN I was working in Paris in 1904, I heard Professor Doyen use these words:—"No man can call himself a gynaecologist unless he can perform a vaginal hysterectomy in private."

Such a statement would appear sweeping, but there is a deal of truth contained therein, for whereas in hospital certain risks can be taken and a certain boldness acquired, it is altogether another matter when dealing with a private patient in a nursing home with no resident medical officer, for the operation of vaginal hysterectomy requires skill, courage, experience and perspicacity.

The surgeon having started vaginally, must be capable of finishing the operation by the same route, and he should be capable of dealing with any of the complications that may arise, for it is a confession of weakness and lack of diagnostic skill if after starting vaginally he has to terminate abdominally.

Historical.—Soranus, Aretæus and Paulus Æginata, circa 150 A.D., referring to the ætiology of prolapse, allude to an operation for extirpation of the uterus, and Alsaaravius the Arabian, circa 1080 A.D., directed that when attempts at reduction of the uterus fail, the organ should be removed from below.

It is possible, of course, that these ancients who advised operation for prolapse may have been considering a case of chronic inversion of the uterus, or one of those large pedunculated submucous fibromata of the cervix or uterus, which are so commonly seen in the East; but considering that Hippocrates, the Father of Medicine, 2,400 years ago described a case of procidentia which he saw "hanging down like a scrotum between the legs of a woman," I am inclined to think that the Arabian was the first to anticipate the modern operation, and that the first copyist of this operation of whom we have record, was Volkamer of Nuremberg in 1675. From this date onwards, the operation gradually became more popular and was advanced for cancer and fibroids of moderate size.

In the United Kingdom of Great Britain, Alex. Hunter of Dumbarton in 1799 was the first to perform the operation.

In the latter part of the nineteenth century, Paen and Doyen inaugurated morcelllement and hemi-section of the uterus, and Schuchardt demonstrated the importance and success following a para-vaginal incision when extirpating the uterus in a difficult case.

Indications.—Mr. Herbert Spencer in the *British Medical Journal* of March 31st, 1928, writing on the subject of vaginal hysterectomy states, "The superiority of the recovery over that after abdominal hysterectomy is so marked that it is surprising that there exist gynaecologists who never perform the operation."

Eighteen years experience of this operation in India has led me to confirm this remark, for there can be no question that this operation is peculiarly valuable in this country, and for that matter in any country, provided the surgeon has the courage of his convictions, such digital dexterity as to be absolutely certain of his vaginal findings on examination, and is capable of co-ordinating his surgical skill and knowledge of anatomy. Wherefore, I make a plea for this operation, for amongst Orientals the idea of "cutting the stomach" strikes terror into many a patient, whereas if the operation can be done from below, consent is readily given.

It is contended by some that the abdominal operation is easier and permits perfect vision and a certain security from such risks as injury to the bladder or ureter and hæmorrhage, but for my own part I consider that in a suitable case such arguments are spurious and denote an inferiority complex, for we all realise that there is a subconscious element or structure of grandiosity which tends to make young surgeons prefer the panorama and joy of doing an abdominal operation before spectators, rather than as *they* say, "fiddling about in the dark"; although the immediate and remote results of a vaginal hysterectomy from the point of view of the patient, are far better.

As I have said above, the end all and be all of the operation is digital dexterity and diagnostic acumen, and after that *l'audace toujours Paudace*.

I have done 150 vaginal hysterectomies for the conditions appended with a mortality of 2 per cent., but I have never as yet performed morcelllement or hemi-section in the course of the operation, for the reason that I consider the limit of size of a fibroid projecting from the body of the uterus or cervix is that of a cricket ball. If the tumour were above that size, I should perform abdominal hysterectomy.

It will be seen that a great many of the operations have been for *Fibromata* (36 per cent.) which is to be expected considering that in the tropics, fibroids are exceedingly common, and the excessive hæmorrhage which they give rise to brings them to the gynaecologist early.

In Western countries no doubt, large numbers of these cases would be treated palliatively or by electro-radiotherapy, but my experience of radium has not been fortunate, for though I can

give you no actual statistics, I have heard it stated by at least 20 per cent. of my patients, that they have been treated by radium or X-rays before seeing me, but nevertheless the hæmorrhage has continued or the tumour has increased in size.

Moreover, in 11 patients, four of them nuns, who had been submitted to radiotherapy, I have had to do an abdominal hysterectomy and remove large tumours of the uterus which had apparently rapidly grown after radium treatment, and in eight of them, either *post hoc* or *propter hoc*, malignant degeneration had occurred. In one, red degeneration was present.

Before undertaking vaginal hysterectomy for fibroids of, or less than the size of a cricket ball, it is important to elicit whether there is pain in the tumour or whether there have been attacks suggestive of localised pelvic peritonitis, for there may or may not be salpingitis or hydrosalpinx with cystic ovaries.

Careful vaginal and rectal examination will tell you whether the tumour is mobile or fixed. If it is fixed, the probabilities are that the rectum or intestines are densely adherent and vaginal operation is precluded. If I am in doubt on this point, I defer decision as to the route of operation until the patient is under the anæsthetic, for if the vagina is capacious and the tumour can be moved down or pushed up with a vulsellum on the cervix, I should not hesitate to go vaginally.

In at least 30 per cent. of the fibroids I have removed vaginally, there have been naked eye evidences of previous tubo-ovarian inflammation, and one has wondered whether the fibro-myomatous hypertrophy of the uterus was due to the tubo-ovarian disease, or whether the inflammation of the adnexa was secondary to the tumour, remembering what a witty Frenchman said "Fibroids are the reward of virtue, babies the reward of sin," inferring, of course, that fibroids are most frequently found in the sterile woman.

However, in fairness it must be stated that in 50 per cent. of the fibroid cases, the patients had had either abortions or one child, and that any such operation, spectacular and difficult as it may appear, is made much easier if the vagina is capacious and the pelvic diaphragm lax. So far, I have never had to make the Schuchardt paravaginal incision in order to remove one of these tumours.

The next most common indication for vaginal hysterectomy in the tropics, is undoubtedly *chronic metritis*, for this "clinically malignant" uterus, especially what Mr. Fletcher Shaw calls the *large sub-involution type*, with its excess of elastic and fibrous tissues microscopically, is, as one would expect in a country where ante-, intra- and post-natal care hardly exist, extraordinarily common.

The cause of this sub-involution type is of course a low grade degree of sepsis, either from

a lacerated cervix or an incompletely emptied or retroverted uterus after labour or abortion.

In a small proportion, the chronic metritis has been of the *hyper-trophic type*, that is, on section there has been an excess of muscle and fibrous tissue in the uterus, and its mucous membrane is like the pile of a Turkish carpet, soft and thick or villous. This type is very commonly found in the prostitute, and I think is seen (and will be seen more commonly in the future) as a sequel to the almost universal measures of contraception that are adopted nowadays.

In another type of which I have five specimens the uterus is small and thin and on section resembles the chronic granular kidney. This is the *arterio-sclerotic type*, and you will see the thickened blood vessels cut across looking like white millet seeds, and in the fresh specimen they projected on the cut surface. These are the cases which bleed furiously and are analogous to the so-called cases of renal epistaxis. They all have a high blood pressure, and in many there is generalised arterio-sclerosis. In 45 per cent. of my chronic metritis cases, curettage had been performed from one to three times previously by other surgeons.

Hæmorrhage with or without backache is the indication for operation, but before performing vaginal hysterectomy digital examination must exclude extensive tubo-ovarian inflammation, for, as I have said, puerperal low grade infection is the commonest cause of chronic metritis, and backward displacement of the enlarged uterus is the rule rather than the exception in these cases; but if the organ can be moved forwards, and with the forefinger in the vagina and the middle finger in the rectum, no great tubo-ovarian mass can be felt, the operator need feel no anxiety.

I particularly wish to stress such digital examination because many times my house surgeons or general practitioners, have doubted the feasibility of vaginal hysterectomy, but it should be remembered that it is almost the rule in these cases to find thickening of the postero-lateral parametrium and utero-sacral ligaments, which is a very different thing to finding dense adhesions in the pouch of Douglas between the uterus (or its adnexa) and the bowel.

Particularly do I wish to make a plea for vaginal hysterectomy in those cases of chronic metritis in India, for a great number of these poor souls come from distant places and run away if an abdominal operation is suggested, whereas if the gynaecologist is confident and dexterous, nine-tenths of these patients can be cured by hysterectomy from below. We should remember that every one of these patients who goes back home cured, is in her own way a missionary and gospeller of the advantages of expedient Western surgery, over the tinkering gynaecology she has hitherto suffered.

Of course I am aware many gynaecologists advise radium for these cases, but unfortunately there is no Government supply of radium in this

hospital or Province, and therefore, rather than permit poor patients who have come from a long distance, to suffer further expense, inconvenience and possible disappointment, in the treatment by radium, I prefer to do vaginal hysterectomy seeing that there have been no deaths out of 43 patients operated on for chronic metritis.

Moreover it must be remembered that radium used for chronic metritis, although ideal in a young woman with no tubo-ovarian disease, sometimes has been known to set up a violent exacerbation of old salpingo-oöphoritis, rendering the last condition of the patient worse than the first.

A proportion of my cases (33 per cent.) have been operated on because they had the so-called *precancerous cervix* (Howard Kelly) that is, a cervix lacerated, everted and eroded with deep infiltration of the mucosa and endocervicitis. In some of these cases the cervix was duck-bill-like, the lacerations extending right up to the vaginal vault and in a few, as high as the internal os,—the results of obstetrical injuries, forceps, pituitrin or precipitate labour.

These patients suffer from leucorrhœa, menorrhagia and backache, the backache being due to lymphangitis and swelling of the glands in the hollow of the sacrum.

The cervix is the tonsil of the pelvis, and just as in tonsillitis there is sub-maxillary gland enlargement, so in cervical inflammation the sacral glands are swollen and press upon the sacral nerves.

The cervical condition is a source of chronic inflammation and chronic irritation, and I am persuaded despite arguments to the contrary, that this condition is more often than not, a precursor of the cancer of the cervix which is so common in young multiparæ in Bengal. Moreover, in most of these cases there is a certain degree of chronic metritis due to the chronic sepsis in the cervix, therefore I am sure that the correct treatment of severe cases of this character is vaginal hysterectomy, an operation of comparative ease and subsequent gratitude. In minor conditions of course I employ the usual methods of amputation, trachelorrhaphy or electric cauterisation.

Of course, in some of these cases a high amputation of the cervix is both wise and permissible, but in the type of case for which I am advocating vaginal hysterectomy, such an operation as amputation would leave a chronically inflamed corpus uteri with but a small chance of future conception and a possible risk of continuance of the symptoms, or atresia or cancer.

Out of my 150 cases, it will be seen that in only 7 was the operation performed for *cancer of the cervix*. In three of these the patients were extremely fat, with flabby hearts, and locally there was an early condition of squamous-celled carcinoma, diagnosed beforehand by removal of a wedge of tissue.

One has been lost sight of, but two are following their vocations five and seven years after operation. In each of these cases, a large flap of vagina was removed along with uterus, tubes and ovaries.

Of the others, one had Graves' disease and is alive without recurrence seven years later, the other had second degree procidentia. The operation was extremely easy but she has been lost sight of, unfortunately.

In one other the patient died shortly after operation, the result of shock. She was almost ex-sanguine before operation due to excessive bleeding from an early cauliflower type of cancer, and the operation was performed not with the idea of a "cure," but to stop the hæmorrhage so that she might proceed to the radium institute 300 miles off.

For my own part, I would not advise vaginal hysterectomy for cancer of the cervix except in exceptional conditions such as the above, for I am convinced, speaking from a tropical experience only, that an operable case of cancer of the cervix is best treated by radium and then if desired, by abdominal hysterectomy, even though such an operation is made more difficult by the primary application of radium.

In one case of Wertheim's hysterectomy performed 18 months ago by me, after two radium applications, the patient was completely free of any signs of recurrence when seen last month. The parametrium in her case, when exposed was fibrous and made dissection of the ureters a very tedious business. The iliac glands, when examined microscopically, showed no evidence of malignancy.

In one case, vaginal hysterectomy was performed for cancer of the cervix in a patient three months pregnant. She was extremely anæmic from hæmorrhage and had a large spleen. The operation was easy, but six months later she was seen in the out-patient department with a recurrence. She had refused post-operative radium treatment.

In two cases the operation was performed, because at the time of a diagnostic curettage the material obtained was clinically that of a *cancer of the body of the uterus*. Both ovaries and tubes were of course removed. Both of these patients are alive three years afterwards with no sign of recurrence, the clinical diagnosis was confirmed by the pathologist to the hospital.

Out of 300 consecutive cases of operations for *prolapse of the uterus* vaginal hysterectomy has only been done on eight occasions, and the only reason for doing this operation was because there was marked enterocele as well as procidentia, and I was anxious to test the technique and confirm the results obtained by other surgeons in America.

In all cases the static results were excellent, but convalescence was somewhat tardy in 3 cases from oozing or sloughing of the posterior vaginal wall. I intend to do this operation on future

occasions more often, but shall reduce the size of the vaginal flaps and use interrupted rather than continuous locking sutures. The operation is an easy one and since it can be done rapidly, and practically bloodlessly, I am sure that in the type of case which is so frequently seen in India, namely, the old debilitated multipara, with shrivelled breasts and nates, it is followed by less shock than the Manchester school operation which is so ideal in strong and fairly healthy Western women, but which of course takes 45 to 60 minutes and is by no means a bloodless affair.

I intend to do the Mayo operation more frequently in suitable cases, but there is one difficulty that this operation does not adequately forestall, namely, post-operative cystocele—if the genital aperture is very enlarged. (It is possible that the technique of Lilian Farrar would have to be followed for complete success in such a case.)

Post-operative cystocele is no light matter to deal with after vaginal hysterectomy, for like congenital prolapse, the structural anatomy is defective. For this reason, as I have shown in a previous paper, I incline to advise the Fothergill, Watkins or Frank operations for 90 per cent. of the cases of prolapse we see in India, even though they are more difficult for patient and surgeon.

There was one case of *dysmenorrhœa* in a childless Indian widow aged 35, which had failed to react to any treatment at the hands of many physicians and surgeons. The uterus was small, there was no adnexal disease or evidence of endometrioma. The operation was easy, the uterus tubes and ovaries being removed.

TABLE OF OPERATIONS.

Disease.	Number of operations.	NATIONALITY.		Mortality.
		Indian.	European.	
Fibroids ..	49	33	16	1
Chronic Metritis	46	31	15	..
Precancerous Cervix.	36	16	20	1
Cancer of Cervix.	7	3	4	1
Cancer of body of the Uterus.	2	1	1	..
Prolapse of Uterus.	9	7	2	..
Dysmenorrhœa (very severe.)	1	1	..	..
TOTAL ..	150	92	58	3

As regards the actual operation, I need not describe the two common methods of procedure for they are so excellently illustrated in every large gynaecological text-book, but there are a few practical points which experience has taught me, that may be useful,

(1) Always examine the patient carefully when under chloroform before commencing operation.

(2) If the patient is a nullipara, be sure that the vagina is capacious enough to permit access, and that the cervix can be pulled down. This is particularly important when dealing with fibromata.

(3) After making the vaginal cuff incision and pushing up the bladder, delineate the transverse white line of the peritoneal reflection, before boldly cutting the utero-vesical peritoneum. Then put in your anterior retractor.

(4) If in doubt, open up the pouch of Douglas first, and with a forefinger hooked forward, palpate the posterior surface of the uterus to see that it is free of adhesions, then pass the finger laterally so as to feel the broad ligament at the edge of the uterus. In this way you can make sure of the anterior peritoneum and that the bladder is pushed up and well out of the way before opening the utero-vesical pouch.

(5) Use reliable 21-day catgut from below upwards. The first two ligatures tie the cervical artery on each side. The uterine artery is tied twice, one ligature above the other on each side, but remember the principle of tying the first knot and then cutting the artery with scissors before tying the second knot. Once the uterine arteries are tied and cut (contained as they are in the cardinal ligaments), the cervix will descend to or beyond the vaginal orifice. Then the round ligaments are tied on each side and the tubes appear.

(6) When dealing with a fibroid tumour, it may not be possible as when dealing with a small or a "chronic metritis" uterus to remove both tubes and ovaries with the tumour, therefore I would advise you to clamp, each tube so that the tumour, now free, can be removed with ease first.

(7) Always expose both ovaries; if diseased, one or both must be removed, but should there be no indication for their removal, they may be left.

(8) Always remove both tubes whatever their condition. This is a perfectly simple procedure and is done by means of catgut on a needle and a long holder. If you do not remember this point a time will come, as it did to me in 8 of my first 50 cases, when you will find three weeks to six months after operation, a curious red and pointing soft mass at the top of the vagina projecting through the scar, giving rise to irregular bleeding (especially after coitus). This mass is a portion of prolapsed tube. It was this occurrence which first made me realise the importance of complete resection of the tubes whatever their condition, for a bleeding prolapsed tube is likely to make the patient or perhaps some general practitioner think that she has cancer at the vault of the vagina.

(9) Before closing the wound, that is suturing the anterior to the posterior folds of the

peritoneum, I always suture together with catgut the two broad and utero-sacral ligaments in such a way that the cut edges are downwards towards the vagina, and the peritoneal surface upwards, the ovaries on each side being sutured lightly to the peritoneal surface of the round ligament.

(10) As a rule before completely closing the peritoneum from below, I put a small gauze drain into the pelvis at one angle of the wound, which is removed in 24 hours. In perfectly dry and easy cases, the wound is completely closed at once without drainage.

(11) The patient is catheterised eight-hourly for the first 48 hours; she is placed in Fowlers' position, rectal saline is given and the bowels are opened by castor oil on the third morning.

(12) If you are in doubt of your ligature material, use silk twist leaving the ends long. For a few years I used silk-worm gut, but this caused irritation, discharge and sometimes bladder trouble. From the second day, whatever material is used, vaginal douches twice daily are always ordered. I have never used the "long clamp" method of operation.

(13) In only one case out of my 150 was the bladder injured, this was a case where there was a good deal of old parametritis in the left fornix; the injury did not show itself till the fifth day when the urine escaped due to sloughing of a small area at the base of the bladder. In one case only secondary hæmorrhage occurred. The ureter was never injured in any case. Intestinal obstruction due to adhesion of or kinking of a loop of intestine in the true pelvis has not been seen in this series of cases operated upon during the last seven years.

SUMMARY.

The advantages of vaginal hysterectomy are:—

- (1) The rapidity of the operation. I usually finish under the half hour.
 - (2) Absence of shock.
 - (3) Lessened risk of infection because the operation is extra-peritoneal.
 - (4) No painful scar or risk of post-operative hernia.
 - (5) The operation can be done on patients in India who would absolutely refuse any abdominal operation.
 - (6) For this reason it is a life-saving operation for such a patient in India, bleeding from chronic metritis, small fibromata or very early cancer.
 - (7) It is the ideal operation for the precancerous cervix and in certain conditions of prolapse in old women.
 - (8) The patient is allowed up on the 10th day and she leaves hospital on the 16th day.
 - (9) On five occasions, it has been possible to do myomectomy although the operation had been commenced with the idea of doing a vaginal hysterectomy.
- Post Scriptum.* During the time covered by this series of vaginal hysterectomies, that is

seven years, 229 sub-total and 180 total abdominal hysterectomies have been performed with a respective mortality rate of 6.1 and 13.3 per cent., that is a total mortality rate for both types of operation in this hospital of 9.2 per cent. in patients of all communities.

This mortality may seem high as compared with the 1 to 2 per cent. mortality of Great Britain. But it should be remembered that a great many of these patients arrive extremely ill from hæmorrhage, and have had intercurrent tropical diseases, such as kala-azar, malaria and dysentery.

I am indebted to Dr. M. Sirkar, Registrar of the Hospital for very kindly looking up the hospital and private records of these cases. 111 operations were performed in the Eden Hospital, 39 in nursing homes or private houses.

It is to be hoped that it will not be long before an efficient Radium Institute is established in Calcutta, for the proper treatment of many gynæcological conditions.

At present much suffering and expense is incurred from the fact that patients applying for treatment at the Eden Hospital are compelled to proceed to Patna if radium therapy is necessary.

PROSTATISM.

By SIR JAMES REID ROBERTS, C.I.E.,
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Nor merely has there been of late an improvement in the methods and technique of the operation of prostatectomy, but a recognition that the question of renal adequacy and the condition of the bladder must be gone into before a decision to operate is arrived at. The reduction of mortality of about 25 per cent. in cases undertaken in general hospitals to that of about 9 per cent. in special institutions in England is due in the main to the introduction of the operation in two stages, where renal inadequacy and cystitis are discovered to exist. In other words, it is *most important to test the renal function*, especially before proceeding to operate. In the majority of patients presenting themselves with "prostatism," i.e., frequency of micturition, difficulty in passing urine, dribbling of the stream and a varying amount of residual urine, it is important to remember that the kidneys have been subject to back pressure, and are either functioning badly or are damaged. Relief by constant catheterisation does not produce the same good effects as that of suprapubic cystotomy and drainage by means of a rubber-tube, self-retaining or otherwise, for a fortnight at least in order to relieve the back pressure and subject the cystitis to treatment by rest and irrigation of the bladder. This then is the method of operating in two stages; after the cystotomy the test of renal function is repeated and improvement or failure to improve is noted. It is remarkable, however, how quickly patients regain their renal adequacy

after the back pressure and residual urine are relieved. Many patients do not come for treatment until acute retention has supervened, though previous to this accident prostatic symptoms have existed. If the bladder is greatly distended and can be felt high up in the lower abdomen it is obvious that we have to deal with a chronic case, and experience has shown that it is dangerous to empty the bladder completely by catheterisation there and then. Anuria may supervene, so it is necessary to give relief by drawing off small quantities at a time every 4 hours, until the bladder is emptied during a period of 24 or 36 hours. The continuance of catheterisation for relief or of leaving a catheter in the urethra or bladder are both measures inviting sepsis sooner or later; so that after relief by catheterisation, it is a sound thing to proceed with a suprapubic cystotomy and permanent drainage. If, however, tests show that good renal function exists, the question of the complete operation in one sitting can be considered and undertaken.

Tests of Renal Function.—On the whole, the best test for the use of the practical surgeon in India is the *urea concentration* test, which is done by giving the patient 15 grammes of urea by the mouth, and then estimating the urea content of the urine during the first, second and third hours. If the percentage is over 2, the kidneys are acting normally; if, however, it is 1 per cent. or 2 per cent., they are impaired; if under 1 per cent., they are damaged and show a danger flag, and until the percentage is increased operation is contra-indicated.

The blood urea is another elaboration, and the tests acting on the principle of watching the excretion of certain dyes, viz., indigo-carmin or phenol-sulpho-naphthalein, need not be described as being of less practical value. One fallacy in the urea concentration test exists if polyuria is present, as a low concentration figure will be arrived at, so that the test is not of value in cases where more than about 130 c.c. of urine are passed in the hour.

The question after reading the above is how is one, as a practical surgeon in charge of a district hospital, to proceed in cases of suspected prostatism with or without enlargement? The case has probably been relieved by a catheter, and sounded for stone, both procedures of some risk; however, it has been done, and we have to make our diagnosis. The first thing to do, after our enquiry for the symptoms, is to make a rectal examination to estimate the size of the prostate, and to note any general, one-sided, or irregular enlargement and its motility or fixation when pressed upwards and sideways by the finger. Remember, that a full bladder is a handicap not permitting of estimation of the upper limit.

The next point to decide is that of the general health and the information to be gathered from our inspection and examination of the urine,

bearing in mind that in the case of being unable to carry out the urea concentration test it is important to look out for the following, as pointing to renal inadequacy:—Digestive troubles, loss of appetite, intense thirst, distaste for solid food, constipation or diarrhoea, dirty tongue coated in the centre, red at the tip, sometimes abdominal distension, hæmorrhoids, or prolapse; uræmic symptoms, such as headache, aching in the limbs, vomiting, hiccough, restlessness, bad dreams and hallucinations; general symptoms, such as loss of weight, dryness of the skin, in fact a cachexia simulating that of malignant disease all point to renal inadequacy.

The condition of the urine will indicate the degree of cystitis present, its reaction, alkalinity, mucus, pus, odour, and whether there is hæmorrhage, for spontaneous bleeding is not uncommon in enlarged prostate and often after instrumentation or rapid evacuation of the urine.

A case showing some degree of the above, or one in whom the signs are well marked, requires suprapubic drainage as an immediate procedure and it may be weeks before the bladder and kidneys recover sufficiently for the enucleation operation. There is, however, a good rule in advanced age; don't do more than establish permanent suprapubic drainage of the bladder. A self-retaining tube (Pezzer's) of rubber can be introduced, and removed every fortnight to clear off any deposit and replaced; the tight fitting of the tube in the wound prevents leakage, and the tube can be plugged, and the bladder emptied from time to time by the patient, or drained into a rubber apparatus. This means that the patient can get about, is independent, improves in health, and can be taught to irrigate the bladder with lotion from time to time and keep himself clean. No tube should be allowed to rest on the base of the bladder, as great irritation will ensue. Some old men become quite satisfied with this permanent drainage and it is ever so much better than constant catheterisation, with the urethral irritation this is apt to produce, and the danger of sepsis always at hand.

If the patient is of moderate age, and especially if he has a large adenomatous prostate after suprapubic drainage, and even without this preliminary procedure if the renal adequacy is judged to be good, enucleation can be proceeded with.

The cystoscope is a useful adjunct to genito-urinary surgery; but it is not a necessity for prostatic enlargement diagnosis. That it will become more and more an item of equipment in Indian hospitals I am certain; but, with 3 sizes of Sir H. Thomson's sounds, it is surprising what information they can be made to give in practised hands, with the point rapidly moved from side to side of the bladder by twisting the handle, and reversing the point to examine for any post-prostatic pouch, stones, trabeculæ, diverticula, the size and protrusion into the bladder of the prostatic middle lobe can all be identified.

There is a condition which it is as well to be thoroughly acquainted with; it is described as prostatism without enlargement. A patient comes with all the symptoms of a prostate; he has a large distended bladder with residual urine and he may have had an attack of retention, yet no enlargement can be felt per rectum, and there is no obstruction to the passage of a catheter. This is apt to be called atony of the bladder due to distension; true this has produced a stretching of the muscle fibre until it is unable to act, but the obstruction is at the neck of the bladder, and is due to the so-called fibroid prostate without obvious enlargement. The condition has been produced as a sequela of a prostate due to gonorrhoea years ago, leaving behind a gland infected with staphylococci in its tubules, and the seat of a chronic imperceptible prostatitis. With the contraction of the fibrous tissue urinary obstruction results. This class of case is nowadays dealt with by fulguration, i.e., diathermy, by means of an electrode burning a path through the prostatic bar, or by the diathermy punch; or the case is subjected to complete enucleation. I have found that the introduction of a lithotrite into the prostatic urethra, and stretching the part by separating the blades, gives a good result lasting for some weeks or months. The operation is simple and is quickly performed. The recovery of the over-distended bladder has to be dealt with, or the result expected will be subject to disappointment. This is a useful operation for any district surgeon, and can be repeated as he is not likely to have the diathermy apparatus alluded to. One thing I would advise is always to have a couple of Pezzer's self-retaining tubes in the hospital equipment ready for suprapubic drainage. A wooden plug inserted into the tubal opening can retain the urine in the bladder for about 2 hours or so, allowing the patient to get about, and the bladder to function; meanwhile a rubber urinal which straps to the leg can be ordered.

THE NUTRITION OF THE LENS AND VITREOUS.

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I USE an analogy as introduction which I shall appeal to later on.

What are the functions of the rhythmic contractions of the uterus during pregnancy? It is granted that these exist and are so marked in twin pregnancies as to cause oppressive flushings of the face in the later months; a lot of crude mechanical theories exist to explain them which have no sound basis. The one I advance has, I think, not been advanced by any one else.

A limiting membrane separates the placental sinuses from the uterine sinuses. Through this limiting membrane the nutrition of the foetus

passes in and the waste passes out. The nutrition is presented on the outside of this membrane by the blood stream in the uterine sinuses. Considering the small area of the inlet arteries and the vast area of the sinuses, the force conveyed from the heart has not enough power to drive the blood forward into the veins. The uterine contractions come into play, pressing the blood between the relatively incompressible foetal sac and the muscular wall, periodically driving it forward into the venous circulation; hence the periodic flushings are observable. This mechanism under the control of the nervous system periodically fills up the sinuses, leaves the blood long enough in contact with the membrane to become deoxygenated and to take over CO_2 and is then flushed on. These contractions are thus respiratory and nutritional and on them the life of the foetus depends.

In the case of the eye, we have the lens and vitreous each enclosed in its limiting membrane. The nutrient medium for both, I think we are all agreed, is the aqueous humour to which their limiting membranes are exposed, also that the aqueous is secreted by the gland-like cells of the ciliary body. Theorists, of course, dispute whether it is the result of osmotic action or whether it is a true secretion as much as bile is a true secretion. The true secretion view I hold. It admits of the mechanism going out of order and then supplying a pathological pabulum, and hence disease which we know does occur. The osmotic view would necessitate constancy in composition and hence exclude nutritional disease apart from the fact that it would not provide a specialized pabulum.

There is no reason why the lens and vitreous should not take their requirements from the aqueous and give back their waste to it through their limiting membranes, in the same manner as the foetus does to the blood in the uterine sinuses.

This method of nutrition requires a regular circulation of the aqueous. The so-called pump-like mechanism, so clearly demonstrated by Professor Thompson—muscular fibres of the ciliary body acting on the scleral spur and through it on contraction drawing open the slit-like openings of the canal of Schlem and on relaxation admitting it to fall together like a valve—I prefer to call the "sluice-like" action. In principle its action should be periodic to be economic, allowing the nutrient medium a certain time for diffusion and then to pass it on and admit a fresh supply; this the sluice-like action above-mentioned under the control of the nervous system would supply.

I hold that senile cataract and glaucoma are local starvation diseases due to the mechanism which secretes their special pabulum having gone out of order and thus supplying a pabulum which is not physiological. I have demonstrated in a number of papers that an intense hyperaemia induced over the ciliary region re-establishes the function of that mechanism as evidenced by the clearing up of the lens in the early stage of

cataract. I hold that glaucoma is due to a different disorder of the function of that secreting mechanism, supplying a pabulum which induces oedema of the vitreous which, in turn, presses forward the structures in front of it and in this way puts the sluice-like mechanism out of gear—hence intra-ocular tension. If this tension is not controlled, it dominates all other factors. At the present time the treatment of glaucoma is the treatment of the one symptom of pressure and is aimed at nothing else. In practice it is fairly successful. What is its real though not recognised rationale? The organism in health secretes against a pressure of roughly 20 m.m. of mercury; an iridectomy or trephining reduces tension for a number of days much below normal by propping open an artificial sluice gate; Nature endeavours to put up normal tension and cannot do it—hence enormously increased secretion of aqueous which implies the induction of an intra-ocular hyperæmia of the secreting mechanism which, in turn, re-establishes its physiological condition. This view, if accepted, would alter fundamentally our conception of glaucoma and its treatment. A mechanical drain for the performance of a physiological function does not appeal to me; if it is too large we have a soft eye, if too small we have a hard eye. We have no means of determining the exact size which will maintain physiological tension. I hold that when iridectomy or trephining is successful, it merely acts until physiological equilibrium of the nutrient mechanism has become re-established after which they have no *raison d'être*.

The view put forward above might imply in glaucoma the induction of an intense hyperæmia over the ciliary region, controlling tension, as often as necessary, by tapping the anterior chamber until equilibrium had become re-established.

I now suggest to those in a position to do so:—

(1) To make a careful record of the pulsations of the aqueous, if any, and to compare them with the cardiac pulsations,

(2) a careful analysis of the aqueous in health,

(3) a careful analysis of the aqueous in the early and immature stage of cataract and in acute and chronic glaucoma in the living subject—the pathology of the living; this can be done without the slightest risk to the patient.

NOTES ON THE USE OF CERTAIN PREPARATIONS IN LEPROSY.

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A. *Copper chloride-p-diazoiminobenzene hydrochloride*, prepared by the Wellcome Chemical Research Laboratories.

The use of copper salts in the treatment of leprosy has been advocated by various workers. Takano (1916) records favourable results with Cyanocuprol. Sugai (1916) (1918) treated a number of cases with copper cyanide and with potassium cupro-cyanide with apparent benefit. Matta and Devoto (1922), Rho (1924) and Urbino (1925) claim to have effected decided improvement in their cases from the use of cuprocyan and cuprioidase.

Copper chloride-p-diazoiminobenzene hydrochloride is stated to contain 14.3 per cent. of metallic copper. It undergoes decomposition if kept for any length of time in strong daylight; it is readily soluble in N. saline but the solution is unstable and it must be freshly prepared; moreover the solution cannot be sterilised by heat. It is claimed that the salt itself is sterile and it is recommended that the solution be made up by dissolving gm. 0.02 of the salt in 10 c.c. sterile N. saline; the adult dose is from 1—10 c.c. (representing gm. 0.002—0.02 of the salt given intravenously twice or thrice weekly).

A supply of this copper salt sufficient to test its action on 9 cases was received from the makers. The average duration of treatment in the group was 6.6 weeks with a minimum of 1.7 and a maximum of 19.0 weeks. The results are shown in Table I:—

An analysis of the table reveals the following facts:—

(1) Copper chloride-p-diazoiminobenzene hydrochloride in relatively large doses has the property of stimulating the onset of leprosy reactions. (Cases 2, 3, 5, 6, 8 and 9).

(2) In small doses it is occasionally effective in relieving certain of the local manifestations of the leprosy reaction particularly nerve pains. But this action is apt to be inconstant (Contrast cases 1, 4, 6 and 7). This difference in the action of small and of large doses of the copper preparation with respect to leprosy reactions is one which is apparently common to the heavy metals and similar findings have been demonstrated after the use of antimony and gold.

(3) Apart from its reaction producing power, the particular copper salt tested appears to have no action on the course of the disease even after prolonged and relatively heavy dosage (Cases 2 and 5).

No toxic effects directly attributable either to the immediate or cumulative actions of the preparation were detected during the course of the experiment.

Careful bacteriological examinations carried out before, during and after treatment did not reveal any changes in the numbers or staining reactions of the organisms such as would suggest any direct bactericidal action of the preparation.

B. *Succinol*.—The precise chemical composition of this preparation has not been revealed; it is stated by its originator to be "a complex

TABLE I.
Results of Treatment with Copper chloride-*p*-diazoininobenzene hydrochloride.

	Case.	Type.	Dosage.	Total dosage.	Notes.
1	(L. M.)	B ²	gm. 0.004—0.018 thrice weekly.	gm. 0.08	Had persistent pain in both ulnar nerves; this cleared up under small doses of the copper salt. No febrile reactions. Bacteriologically positive at the end of treatment.
2	(I.)	B ²	gm. 0.002—0.02 thrice weekly.	gm. 0.82	Signs and symptoms of leprosy reaction after maximum doses. Bacteriologically positive at the end of treatment.
3	(De la, B.)	B ³	gm. 0.002—0.01 thrice weekly.	gm. 0.08	Signs and symptoms of leprosy reaction after doses above gm. 0.01. Bacteriologically positive at the end of treatment.
4	(C.)	B ³ —A ₂	gm. 0.002—0.004 thrice weekly.	gm. 0.06	Persistent leprosy reaction prior to treatment. This reaction proved resistant to the copper salt. Remains bacteriologically positive.
5	(D.)	B ²	gm. 0.002—0.02 thrice weekly.	gm. 1.0	Signs and symptoms of leprosy reaction after maximum doses. Clinically improved, but remains bacteriologically positive.
6	(De. S.)	B ³ —A ₂	gm. 0.004—0.008 thrice weekly.	gm. 0.03	Persistent ulnar nerve pains prior to treatment. Unaffected by doses of the copper salt. Signs and symptoms of leprosy reaction in doses above gm. 0.008. Remains bacteriologically positive.
7	(F.)	B ³	gm. 0.004—0.008 thrice weekly.	gm. 0.17	Signs and symptoms of leprosy reaction prior to treatment. These subsided after 3 injections (each of gm. 0.006) of the copper salt. Remains bacteriologically positive.
8	(H.)	B ³	gm. 0.002—0.008 thrice weekly.	gm. 0.03	Signs and symptoms of leprosy reaction after doses above gm. 0.008. Remains bacteriologically positive.
9	(D. T.)	B ²	gm. 0.002—0.02 thrice weekly.	gm. 0.16	Slight local and general reactions after maximum doses. Bacteriologically positive at the end of treatment.

organic compound containing succinic acid." It probably also contains lactic and tannic acids, benzo-quinone, cane sugar, and urea with potassium and calcium in combination.

The preparation is dissolved in sterile distilled water in the proportion of gm. 0.05 per 1 c.c. and the dosage recommended is gm. 0.01 up to gm. 0.2 increasing "according to the strength of the patients and the duration of the disease." The frequency of dosage is not stated: organic

diseases of the heart, lungs, and arteries contra-indicate the use of Succinol.

We tested the effect of this preparation on 9 advanced cases of leprosy: intravenous administration was given twice or thrice a week according to the tolerance of the patient. The average duration of treatment in the group was 8.5 weeks with a minimum of 5 and a maximum of 12 weeks.

The results are shown in Table II:—

TABLE II.
Results of Treatment with Succinol.

	Case.	Type.	Dosage.	Total dosage.	Notes.
1	(Z.)	B ³	gm. 0.01—0.2 thrice weekly.	gm. 1.75	Slight flattening of lesions. Bacteriologically positive at the end of treatment.
2	(S. K.)	B ³	gm. 0.01—0.16 thrice weekly.	gm. 4.71	Signs and symptoms of leprosy reaction after first few doses of gm. 0.16. Later doses failed to cause reaction. Bacteriologically positive at the end of treatment.
3	(D. K.)	B ³	gm. 0.01—0.2 thrice weekly.	gm. 3.75	Signs and symptoms of leprosy reaction in doses above gm. 0.08. Bacteriologically positive at the end of treatment.
4	(B. H.)	B ³	gm. 0.01—0.2 thrice weekly.	gm. 5.19	Prolonged leprosy reaction induced after 17 maximum doses. Some clinical improvement. Bacteriologically positive at the end of treatment.
5	(V. M.)	B ²	gm. 0.01—0.2 thrice weekly.	gm. 4.47	Slight clinical improvement. Bacteriologically positive at the end of treatment.
6	(K.)	B ²	gm. 0.01—0.18 thrice weekly.	gm. 1.64	Signs and symptoms of leprosy reaction after every injection. Remains bacteriologically positive.
7	(A. W.)	B ²	gm. 0.01—0.2 thrice weekly.	gm. 3.70	Signs and symptoms of leprosy reaction after every injection. Bacteriologically positive at the end of treatment.
8	(S. Z.)	B ³ —A ₂	gm. 0.01—0.2 thrice weekly.	gm. 3.00	Slight leprosy reaction after doses above gm. 0.12. Bacteriologically positive at the end of treatment.
9	(S. D.)	B ²	gm. 0.01—0.2 thrice weekly.	gm. 3.70	Signs and symptoms of leprosy reaction after every injection. Bacteriologically positive at the end of treatment.

Analysis of the table together with a careful scrutiny of the patients' treatment cards brings the undernoted facts into prominence:—

(1) Succinol has the property of inducing leprosy reactions (Cases 2, 3, 4, 6, 7, 8 and 9).

(2) No marked clinical improvement could be detected at the end of treatment in any of the cases: there was however slight clinical improvement in 3 cases (Nos. 1, 4 and 5).

(3) All the cases remained bacteriologically positive at the end of treatment: careful bacteriological examinations carried out before, during and after treatment did not reveal any changes in the numbers or staining reactions of the organisms, such as would suggest any direct action of Succinol on *M. lepræ*.

(4) There were no toxic effects directly attributable to the preparation.

C. *Fibrolysin*.—This is a compound of thiosinamine and sodium salicylate manufactured by E. Merck & Co. of Darmstadt: it is claimed for it that it has the property of softening scar tissue. Its use in leprosy has been recommended in a recent communication from Dr. Otto Krause of Bloemfontein. More than two years ago one of us (J. M. H.) in complete

ignorance of Dr. Krause's work carried out a short trial of the preparation on a few selected cases from the Leprosy Out-patient Department of the School of Tropical Medicine, Calcutta, without obtaining any very striking results.

On theoretical grounds only it seems reasonable to imagine that Fibrolysin by breaking down the fibrous tissue surrounding individual lepromata might lay the latter open to the action of anti-leprotic drugs and that hence it might be an important adjuvant in treatment: we determined therefore to carry out a more extended series of trials.

Fibrolysin is put up in ampoule form ready for use (after warming slightly): the dose recommended is 1 to 2 ampoules (2.3 to 4.6 c.c.) twice weekly by intramuscular injection. The preparation was tested on 17 different patients at the School of Tropical Medicine and at the Albert Victor Leper Hospital. The group of cases selected was a representative one comprising patients in all types and stages of the disease. The average duration of treatment in those who finished the course (14 in all) was 8.2 weeks with a minimum of 7 and a maximum of 10.

The results are shown in Table III:—

TABLE III.
Results of Treatment with Fibrolysin.

	Case.	Type.	Total dosage.	Notes.
1.	(M.)	A ₁	29.9 c.c.	Given with potassium iodide gr. 240 twice weekly. Headache, giddiness and pain lasting 24 to 48 hours after 2 ampoules of Fibrolysin. No other local or general effects.
2.	(P.)	A ₁	46.0 c.c.	Ditto.
3.	(S.)	B ²	(a) 52.9 c.c. (b) 82.8 c.c.	This patient though strongly positive bacteriologically has never shown signs of reaction under any treatment. Course (b) combined with potassium iodide gr. 240 twice weekly: no local or general effects. Bacteriologically positive at the end of treatment.
4.	(M. A. S.)	B ²	23.0 c.c.	Two ampoules twice weekly caused rise of temperature up to 100°F. for 1 day with tremors and giddiness. Left hospital before completing treatment. Remaining bacteriologically positive.
5.	(K. B.)	A ₂	32.0 c.c.	Given with potassium iodide gr. 30 to 60 twice weekly. Fibrolysin alone caused pain and giddiness. Potassium iodide alone no giddiness. Discharged before treatment completed.
6.	(S. P.)	B ² —B ³	59.8 c.c.	Given with potassium iodide gr. 8 twice weekly, caused reaction and temperature of 101°F. for 1 day. Fibrolysin 2 ampoules alone no reaction pain or giddiness. Potassium iodide alone—reaction and temperature of 101°F. Remains bacteriologically positive at the end of treatment.
7.	(C. M.)	B ² —A ₂	27.6 c.c.	Given with hydnocarpus oil 7 c.c. twice weekly, caused reaction and temperature 100.8°F. for 4 days. Fibrolysin alone—no reaction but pain and giddiness. Bacteriologically positive at the end of treatment.
8.	(D.)	B ²	4.6 c.c.	Given with potassium iodide gr. 6 twice weekly. Giddiness and pain after injection. Treatment cut short on account of hæmorrhoids and anæmia.

TABLE III—(contd.).

	Case.	Type.	Total dosage.	Notes.
9.	(R. D.)	B ^a .	55.2 c.c.	Given with potassium iodide gr. 12, caused temperature of 100°F. for 1 day. Fibrolysin (4.6 c.c.) only, no rise of temperature. Pain and giddiness after injection. Bacteriologically positive at the end of treatment.
10.	(Mn.)	A ₂	62.1 c.c.	Given with potassium iodide gr. 240 twice weekly, caused headache, sickness and vomiting. Potassium iodide alone gr. 240 twice weekly, no symptoms. Fibrolysin alone (4.6 c.c. twice weekly), caused vomiting and headache. No change clinically.
11.	(A.)	B ^a	20.7 c.c.	Given with potassium iodide gr. 5 twice weekly, caused reaction and temperature of 100.2°F. for 2 days with giddiness. Fibrolysin alone caused rise of temperature up to 100°F. for 1 day with weakness and giddiness. Bacteriologically positive at the end of treatment.
12.	(G. S.)	B ^a	41.4 c.c.	Given with oil of <i>Hydnocarpus wightiana</i> 8 c.c. twice weekly and potassium iodide gr. 240 twice weekly. No reaction, pain or giddiness. Still slightly positive bacteriologically at the end of treatment.
13.	(B. M.)	B ^a —B ^a	27.6 c.c.	Given with potassium iodide gr. 30 to 45 twice weekly. No fever: giddiness and vomiting especially after 2 ampoules. Bacteriologically positive at the end of treatment.
14.	(S. A.)	B ^a	52.9 c.c.	Given with oil of <i>Hydnocarpus wightiana</i> 8 c.c. twice weekly. No fever: pain and giddiness especially after 2 ampoules. Bacteriologically positive at the end of treatment.
15.	(A. F.)	B ^a	59.8 c.c.	Given with oil of <i>Hydnocarpus wightiana</i> 7 to 9 c.c. twice weekly. No fever: giddiness and vomiting after 2 ampoules. Flattening of nodular lesions. Bacteriologically positive at the end of treatment.
16.	(R. D.)	A ₂	39.1 c.c.	Given with potassium iodide gr. 240 twice weekly. Fever on one occasion, 101°F. for 2 days. Giddiness, headache and occasional vomiting after injection.
17.	(B.)	B ^a	41.4 c.c.	Given with potassium iodide gr. 10 twice weekly. Caused reaction with temperature of 102°F. for 1 day. Fibrolysin alone, no fever but giddiness after each injection. Bacteriologically positive at the end of treatment.

A study of the table reveals certain features of interest.

(1) In only two cases (Nos. 4 and 11) could Fibrolysin be said to have any direct action on the foci of the disease, as evidenced by signs and symptoms of leprous reaction.

(2) Its action as an adjuvant to potassium iodide in breaking down leprous granulation tissue is negligible. Cases showing signs and symptoms of leprous reaction under a combined course of Fibrolysin and potassium iodide failed to show such manifestations when the latter component was omitted: when potassium iodide alone was employed, the same signs and symptoms appeared as with the combined treatment. It is obvious therefore that potassium iodide is the active constituent (Cases 6, 9 and 17). The same is true of the combined use of Fibrolysin and *hydnocarpus* oil: the latter is the active constituent.

(3) Cases in the non-reacting phase of the disease when under treatment with other

preparations did not pass into the reacting phase when Fibrolysin was added. The claim that this preparation by breaking down fibrous tissue renders resistant cases accessible to treatment does not therefore appear to be substantiated.

(4) Fibrolysin has no direct action on *M. lepræ*: bacteriological examinations carried out before, during and after treatment showed little alteration in the numbers, size, shape or staining reactions of the organisms.

(5) Fibrolysin in many instances manifests certain undesirable side effects such as pain, vertigo and vomiting, especially in doses of 2 ampoules and upwards (All cases except Nos. 3, 6 and 12).

Summary and Conclusions.

(1) The results obtained at the School of Tropical Medicine and Hygiene, Calcutta, and at the Albert Victor Leper Hospital, Gobra, from the use of three different preparations have been briefly recorded and analysed.

(2) Of the three preparations in question, Copper chloride-p-diazoiminobenzene hydrochloride and Succinol appear to have some power inducing the onset of leprosy reactions when used in relatively large doses. In virtue of this "lytic" effect on the leprosy granulation tissue they may be of some assistance as adjuvants in the treatment of the disease. Their reaction producing power is however definitely inferior to that of potassium iodide. Fibrolysin in the amount and frequency of dosage used by us appears to be without action on leprosy granulation tissue.

(3) None of the preparations has any direct action whatsoever on the organismal cause of this disease—*M. lepræ*.

(4) No toxic effects directly attributable to either preparation were noted in the cases of the copper salt and Succinol: the use of Fibrolysin, however, causes certain unpleasant sequelæ, viz., pain at injection lasting up to 48 hours, headache, vertigo, vomiting and sometimes tremors.

We are indebted to Dr. T. A. Henry, the Wellcome Chemical Research Laboratories, London, for a supply of the copper salt and to Dr. Misra of Darbhanga for a generous consignment of his preparation Succinol.

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A SIMPLIFIED BED-SIDE BLOOD-SUGAR METHOD.

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THE introduction of micro-chemical methods during recent times, combining both simplicity and accuracy, for the estimation of blood-sugar, has rendered this important test available to the medical profession. But even so, practically all the blood-sugar methods require considerable laboratory facilities and are not suitable for application at the bed-side and in the mofussil.

Since the introduction of insulin and the modern developments in the diagnosis and treatment of diabetes, the estimation of blood-sugar has become essential in this disease. The blood-sugar question is, thus, of such importance in medical practice that it is considered worth while to evolve a method which could be applied at the

bed-side requiring no other apparatus but what a medical practitioner is expected to possess.

In the present paper a method is described which meets the above purpose. In this method advantage has been taken of the new blood-sugar reagents recently introduced by Folin (1928) of whose method it is a modification. The sugar is oxidised with alkaline potassium ferricyanide and the ferrocyanide produced is measured colorimetrically as Prussian blue. The colour obtained is nearly 5 times as deep as the colour obtained with the alkaline copper solutions.

The results obtained by the present method are fairly accurate for clinical purposes and the technique is so simple that it can be easily mastered in a short time. The quantity of blood necessary for the test is extremely small and can be conveniently drawn from a finger prick by means of a hæmocytometer pipette (up to 0.5 mark only).

Reagents.

1. Tungstic acid reagent:—This is prepared by diluting a mixture of 20 c.c. of 10 per cent. sodium tungstate and 20 c.c. of 2/3 N. sulphuric acid to a volume of 1 litre with distilled water. Add a little toluene as a preservative.
2. Potassium ferricyanide solution:—0.2 per cent. solution in distilled water. The solution should be kept in the dark.
3. Sodium cyanide-carbonate solution:—Prepared by dissolving 8 gms. of anhydrous sodium carbonate and about 1.5 gm. of sodium cyanide in 500 c.c. of distilled water.
4. Ferric sulphate solution:—30 gm. of gum arabic is dissolved in about 600 c.c. of water by heating on the water bath. 5 gm. of ferric sulphate is dissolved separately in 75 c.c. of 85 per cent. phosphoric acid and 100 c.c. of water by means of heat. Allow the solutions to cool and then mix them together and dilute to a volume of 1 litre with distilled water.
5. Standard glucose solution:—0.1 per cent. solution of chemically pure glucose in saturated solution of benzoic acid in water. A little toluene may be added to it.
6. Distilled water.

All these reagents, if kept properly, have good keeping qualities. They can be easily prepared in any chemical laboratory and stocked for later use.

Apparatus.

1. Test-tubes 4
2. 25 c.c. graduated cylinders—(of the same size and make) 2
3. One mark capillary pipette with attached rubber tubing and mouth-piece 1
 (The pipette in Sahli's hæmoglobino-meter or a hæmocytometer (W.B.C.) pipette will do).
4. An aluminium vessel or an ordinary glass beaker to serve as a water bath.
5. One spirit lamp with tripod stand.
6. Strips of filter paper.

Estimation of blood-sugar.

With the pipette draw the standard sugar solution (0.1 per cent.) up to the mark. (If a hæmometer pipette is used it is quite sufficient to draw up to the 0.5 mark). Wipe off the outside of the pipette with a piece of filter paper. Blow out the sugar solution completely on a small piece of filter paper. Put this piece of filter paper in a test-tube marked "S." It is not necessary to wash the pipette after this. With the same pipette draw blood up to the same mark in the usual way from a finger prick. Wipe off the blood on the outside of the pipette with a piece of filter paper. Then blow out the blood completely on another small piece of filter paper. Put this piece of filter paper in a test-tube marked "U." We have now exactly the same volumes of the standard sugar solution and of blood in the two test-tubes "S" and "U." If the pipette of Sahli's hæmoglobinometer is used this volume is only 20 c.mm. (i.e., 1/50th of a c.c.).

Put the two test-tubes "U" and "S" in the boiling water bath for 2 minutes. Then with a graduated cylinder add about 5 c.c. of the tungstic acid reagent to each of the test-tubes. Allow to remain in the boiling water bath for 5 minutes. Then take them out and by means of a glass rod or a clean piece of wire remove the pieces of filter paper. Care is taken to remove as little of the liquid as possible with the filter paper. Not more than 3 or 4 drops are lost in this way which is negligible from a practical standpoint. To each of the test-tubes then add with a graduated cylinder 1 c.c. of the potassium ferricyanide solution and 1 c.c. of the carbonate cyanide solution. Put the test-tubes in the boiling water bath again and allow to remain for 7 to 8 minutes. Then remove and cool. Add 3 c.c. of the ferric sulphate solution to each of the test-tubes. Mix by gentle shaking and let them stand for 5 minutes when the colour of Prussian blue develops.

Pour the contents of the test-tube marked "S" into one of the graduated cylinders and mark it "S." Similarly pour the contents of "U" into the other cylinder and mark it "U." Dilute both "S" and "U" up to the 10 c.c. mark by adding a few drops of water if necessary.

The intensity of colour in each cylinder is proportional to the amount of sugar present.

Calculation.—The sugar is determined colorimetrically by what is known as a "test-tube colorimeter"—a well known procedure when a regular colorimeter is not available. If the colour of the solutions in "S" and "U" match each other exactly when made up to the same volume, then "U" contains the same amount of sugar as the standard "S," i.e., the blood-sugar in this particular case is 0.1 per cent. If the colour of "U" is deeper than that of "S" then go on diluting "U" by adding water drop by drop carefully till the colours of "S" and "U" match

correctly. The blood-sugar is given by the following formula:—

$$\text{Blood sugar (in per cent.)} = \frac{x \text{ (dilution or total vol. of solution in "U")}}{10 \text{ (total vol. of solution in "S")}} \times 0.1$$

Example.—If "U" had to be diluted up to the 22 c.c. mark to match correctly with "S" (vol. 10 c.c.) then blood-sugar = $22/10 \times 0.1$ per cent. = 0.22 per cent.

In diabetics having blood-sugar contents higher than 0.25 per cent., i.e., when the colour of "U" even after diluting up to the 25 c.c. mark is still deeper than that of "S" proceed as follows: Dilute "U" up to the 25 c.c. mark then discard half of the liquid (12.5 c.c.) and again go on diluting till exact colour match with "S" results. In this way the unknown "U" can be diluted 2×2.5 times and we can estimate a blood-sugar content up to 0.5 per cent. For still higher blood-sugar contents the unknown should be diluted even further.

In normal individuals and in hypoglycemia when the sugar content of "U" will be less than 0.1 per cent. go on diluting "S" till the colour of "S" matches exactly with that of "U,"—"U" being kept at the original volume of 10 c.c. The blood-sugar is given by the following formula:—

$$\text{Blood-sugar (in per cent.)} = \frac{10}{x \text{ (dilution in "S")}} \times 0.1$$

Example.—"S" had to be diluted to the 20 c.c. mark to match correctly with "U" (Vol. 10 c.c.) then blood-sugar = $10/20 \times 0.1$ per cent. = 0.05 per cent.

RÉSUMÉ OF THE METHOD.

Standard ("S").

(1) With a capillary pipette draw 0.1 per cent. glucose solution up to mark (a Sahli hæmoglobinometer pipette or a W.B.C. pipette will do). Blow out the solution on to a piece of filter paper and put this piece of filter paper in a test-tube marked "S."

(2) Put test-tube "S" in a boiling water bath for 2 minutes. Then add about 5 c.c. of the tungstic acid reagent and let remain in boiling water for 5 minutes more.

(3) Remove the piece of filter paper with a glass rod and add 1 c.c. of the potassium ferricyanide solution and 1 c.c. of the carbonate cyanide solution and let remain in boiling water for 7 to 8 minutes more. Then take out and cool.

(4) Add 3 c.c. of the ferric sulphate solution, let stand for 5 minutes and then pour the contents of "S" into cylinder marked "S" and dilute to 10 c.c. mark.

Unknown ("U").

(1) With the same capillary pipette draw blood from a finger prick up to mark. Blow out the blood on a piece of filter paper which is then put in a test-tube marked "U."

(2) Steps 2 to 4 same as in the left hand column. The contents of test-tube "U" are finally transferred to a cylinder marked "U" and diluted to a volume of 10 c.c.

Then compare "S" and "U" colorimetrically by means of what is so commonly known as a "test-tube colorimeter."

Summary and Conclusion.

1. A simplified blood-sugar method applicable at the bed-side and in the infusorial is described.

2. The advantages of this method are:—

(1) No special apparatus is necessary.

(2) A very small amount of blood (about 1/50th of a c.c.) from a simple finger prick is sufficient.

Milking or squeezing the finger for blood is not only unnecessary but should be avoided as the blood becomes mixed with tissue-fluid.

(3) The collection of the blood with the capillary pipette is extremely simple and familiar to most practitioners. A W.B.C. pipette can very well be used for the purpose.

(4) The manipulations are quite simple and can be mastered easily.

(5) The results obtained are quite accurate for clinical work.

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AN EASY METHOD OF DRAINING IN-ACCESSIBLE SUPPURATING CAVITIES.

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Method.

Fit the nozzle of a 4 oz. or 8 oz. glass syringe into a Jacques' catheter of the required size and charge the catheter and the syringe with weak iodine solution. Introduce the catheter into the bottom of the cavity to be drained. Inject the solution slowly into it and draw the contents of the cavity into the syringe. Take the syringe out, leaving the catheter still in the cavity, and throw out its contents into a bucket close by. Charge it again with the iodine solution and refit the syringe into the catheter now in the cavity and draw out its contents again into the syringe and throw them out into the bucket. Repeat the process 6 to 8 times until the contents drawn from the cavity are nearly of the same colour as the solution injected. While so doing, it may be necessary to withdraw the catheter a little and change its direction to ensure thorough drainage of the cavity. Before drawing out the catheter finally, see that some solution is left in the cavity to prevent sudden withdrawal of pressure on the blood vessels and other structures which are in relation with the cavity. This precaution is especially necessary when one is dealing with pus in the pleural cavity to prevent air from being sucked into it.

It is needless to state that the catheter, syringe and the solution should all be sterile and the operation carried out with strict attention to surgical cleanliness.

The strength of the iodine solution used is 1 in 80. For practical purposes, it is enough if the dilution made is of faint brown tint.

How the Method evolved.

Case No. 1.

On 13th May 1927, a Chinese boy, 15 years old, called Eng Soung was brought in a country cart to the Civil Hospital, Thalon, with a big penetrating wound of the pleura. It was 4 inches long and 2 inches broad and extended transversely from the middle line of the chest in front at its upper part towards the right. The 1st and the 2nd right intercostal spaces were involved in it. The whole thickness of the 2nd right rib and the right half of the sternum were cut into.

The wound tailed off for three inches at its right end. There was copious extravasation of blood into the pleural cavity and air was entering and escaping noisily. To control bleeding and prevent air from being sucked in, the wound had been wrapped up with dirty clothing. The boy was wounded by dacoits about 11 hours prior to his admission into the hospital. His condition on admission was alarming. His pulse and breathing were bad and he was low. His dying declaration was arranged to be taken immediately. The wound and its neighbourhood were scrubbed with spirit and painted with tincture of iodine. The blood in the pleural cavity was sponged. Edges of the wound were everted and carefully cleansed. To arrest bleeding from the 2nd intercostal artery, the wound was packed on the principle of Desault's method. Two days later, this plug was removed and the wound sutured. But the sutures gave way in a couple of days and the wound began to discharge pus and it became a case of empyema of the right pleural cavity. Pus had accumulated up to the middle of the scapula behind. The patient was too low to stand resection of the rib. A drainage tube to reach the bottom of the cavity was introduced and as much pus as possible was withdrawn by fitting a glass syringe into the outer end of it. The wound was dressed by leaving the tube inside the cavity besides introducing alongside it long strips of gauze for purposes of drainage. The patient was also given his own pus internally.

Mr. John, Sub-Assistant Surgeon, who used to dress the case improved the withdrawal of pus by replacing the rubber tube with a Jacques' catheter of suitable size. The patient, however, did not benefit much from this treatment. His condition grew worse and the temperature began to rise steadily and his breathing became hurried and difficult. A desperate attempt was therefore made to resect the 8th rib in the mid-axillary line under local anaesthesia consisting of cocain, morphia and adrenalin hydrochloride in order to establish free drainage at the dependant part, but it was in vain since the patient developed signs of cocain poisoning. The operation was stopped and the patient was with great difficulty revived.

These circumstances led to the adoption of the method described above and the result was very gratifying. The temperature began to go down, discharge of pus became reduced, the patient's condition steadily improved and he was eventually discharged completely cured on 22nd September 1927, with a big depression below the right clavicle. The breath sounds over this depression and the remaining part of the right side of the chest were, however, quite audible, the only difference between the right and left sides of the chest being that the patient was exercising the muscles of the left side more than those on the right side.

Encouraged by this result I started applying this method in other cases also, and I give below notes of some of them. The results obtained were excellent and happier than those I used to get, especially in the case of joints, by making a counter-opening and flushing them with lotions, such as eusol, weak iodine, normal saline, etc.

Case No. 2.

Muthukarapan, Hindu, cultivator, 22 years old, was admitted into Thaton Civil Hospital on 30th November, 1927, for multiple severe *dah* cut wounds. One of them was on the top of the right shoulder, 7 inches \times 4 inches, communicating with the joint. The tip of the acromion process had become severed. The wound was stitched and an India-rubber tube put in at the dependent part for drainage. Pus formed in the joint in a couple of days.

Flushing the cavity every day through this tube with eusol solution and two intravenous injections of iodine solution given every third day did not have much effect on the temperature which was ranging in the evening between 103.4° and 102.0°F. till 9th December, 1927, when the Thaton Hospital method of draining inaccessible cavities was adopted with the result that temperature began to fall, discharge became less and the wound healed up completely before 6th January, 1928.

Case No. 3.

Panu, an Oriya cooly, who was working in Mokpalin stone quarry in Thaton District, met with an accident on account of a landslip while working at a height of about 25 feet from the ground and hurt his knee. On admission into Thaton Hospital on 12th June, 1928, he had besides two minor injuries on his left leg a triangular-shaped lacerated wound in front of his right knee with its apex directed upwards. Its sides were each 2 inches long and its base was 3 inches long. It was communicating with the interior of the joint. The ligamentum patellæ was torn. The lower end of the patella and the tip of the external condyle had become detached. In spite of thorough cleaning of the wound pus appeared in the joint on the second day after admission. Draining of the joint after the Thaton Hospital method was immediately started. Temperature became reduced and disappeared altogether in a

fortnight's time. The wound became filled up with granulation tissue by 7th July, 1928. The patient was thereafter kept in the hospital for the wound to become completely dry and to help the patient to get the full use of the joint.

THE DIAGNOSTIC VALUE OF A MONOCYTOSIS.

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FROM a perusal of many works on differential diagnosis and leucocytosis, I have been struck with the insignificant place given to an increase in the monocytes of the blood as an aid to diagnosis, whereas in actual practice I have found this feature of a blood picture of very great diagnostic value either as (1) being a sign of a protozoal infection, or (2) in its absence as an indication that no protozoon is present. The fact that an increase in the monocytes occurs in protozoal diseases is well known but probably several factors have operated to militate against its more extended use as an aid to diagnosis. Foremost amongst these is the classification of the non-granular or hyaline cells. These include lymphocytes, large mononuclears and transitionals (Ehrlich). Confusing the issue are many names, such as "pro-monocytes" (Hittmair) "monoblasts" (Ferrata), "monocytes" (Wright). For the purpose of accurate differentiation it is essential for the observer to have a definite classification and to maintain this in all counts. The method I have found most satisfactory is to group the large mononuclears and the transitionals together as monocytes, owing to the difficulty sometimes of determining the differences between them. The normal standard count for large mononuclears can be taken as 1 per cent. and transitionals 2 to 4 per cent. (Ehrlich). A normal percentage of large mononuclears and transitionals combined should not exceed 4 per cent. (Stitt). Not less than 300 leucocytes must be counted and great care is needed to distinguish between large lymphocytes and monocytes. 5 per cent. and over of monocytes will constitute monocytosis, using as a stain any modification of Romanowsky. The distinctions between large lymphocytes and monocytes are as follows:—

Large lymphocytes—the cytoplasm is a clear translucent pure blue; it may contain pinkish granules known as azur granules, but these are of rather large size and do not mar the glass-like appearance. They are from 12 μ to 15 μ in diameter and possess a round nucleus taking a fairly deep rich violet stain.

Monocytes—these are large round irregular or oval cells with a nucleus which is frequently irregular in outline or shows indentations or is sometimes horseshoe-shaped. There is not that sharp distinction between nucleus and cytoplasm that exists in lymphocytes. The cytoplasm gives

the impression of opacity, as if it were frosted glass instead of clear glass and is pale washed out lilac in colour. The nucleus does not stain well and is of a washed-out violent shade (Stitt).

The large mononuclears are considered to have great phagocytic activity and the terms "clasmatoocytes," "macrophages" and "fibrocytes," have been applied to these cells. In the tropics, therefore, where protozoal diseases are so prevalent it can be readily understood why there should be a monocytosis, this being a direct offensive attack of the body reacting to the stimulus of a protozoal infection in contradistinction to a polymorphonuclear leucocytosis reacting against bacterial infection.

A monocytosis having been established it now remains to discover the particular protozoon giving rise to it. It must not, however, be forgotten that in variola, in dengue, about the 4th day in cholera, normally in infants, in diphtheria, in measles, in acute rheumatism, in German measles, in paratyphoid fever about the 10th day (Piney and Berrie), and in exophthalmic goitre (Piney) some degree of monocytosis occurs, varying from 8 to 50 per cent. I need not point out that all these conditions and diseases have definite clinical manifestations and, therefore, present no difficulty or doubt whilst the active disease is present, but when the temperature still persists, it may be only a degree or two, after the active disease has ceased or in any other obscure condition when a monocytosis is present, a protozoon may be suspected and should be searched for. It is common knowledge that any active disease may cause a latent protozoon to develop, the commonest in India being probably the malarial. Numberless blood films may be searched and no malarial parasites be found, yet a judicious administration of quinine will quickly bring the temperature to normal and it will stay there. If this does not happen it may be leishmaniasis in which case there will be some leucopenia in addition to the relative monocytosis, and the "urea-stibamine test" will be positive, or amœbiasis when the reaction of the faeces will be acid and either the vegetative forms or cysts of the *Entamœba histolytica* will be found and possibly some Charcot-Leyden crystals. Again how often one sees cases complaining of pain in the right hypochondrium and on examination finds some hepatic enlargement. The absence of a monocytosis definitely excludes amœbic hepatitis, although often a history of "dysentery" is obtained, whereas the presence of a monocytosis is eminently suspicious of a protozoal infection and a further search will bring the cause to light.

An example of this has recently been under my care of severe pain in the right flank and right hypochondrium with a patch of pleurisy over the centre of the lower part of the middle lobe of the right lung. A differential leucocyte count showed only 2, i.e., 1 per cent., monocytes. The stool contained a small quantity of mucus, and the daily temperature varied between 100 to 102°F. The injection of 4 grs. of emetin

showed no result whatever. Had the cause been *E. histolytica*, a definite amelioration of symptoms would have taken place. As a matter of fact the case proved to be one of pyelonephritis and staphylococcal septicæmia. In another case there was severe pain over the right hypochondrium, slight daily rise of temperature, pyelonephritis and the passage of much mucus with the stools. Daily examinations for many weeks of the stools failed to reveal the *E. histolytica*, although there was a definite history of previous attacks having been stopped by injections of emetin. A differential leucocyte count showed only 3.5 per cent. monocytes. In spite of this, emetin injections, emetin periodide and Stovarsol were given without any improvement whatever. The case proved to be coli pyelonephritis and cystitis and mucous colitis. In another case with splenomegaly, leucopenia and some anæmia with the "urea-stibamine" test positive, but the "formol-gel" test negative, monocytes were only 1 per cent. The case proved to be splenic anæmia.

As a routine measure, a differential leucocyte count is carried out in all my cases in the wards and I daily demonstrate the proof of the diagnostic value of a monocytosis occurring in uncertain fevers, enlarged spleens, anæmia, diarrhoea, headache, abdominal pains, neuralgias and many other conditions of doubtful origin, by finding the protozoon responsible and giving the appropriate parasiticide. Often a valuable pointer is given to the "accès pernicieux" of subtertian malaria, which may simulate heatstroke, coma, epileptic convulsions, delirium, apoplexy, appendicitis and cholera. Timely quinine will save the case where nothing else would and after all is said and done a differential leucocyte count does not take very long or overmuch skill.

In conclusion I again emphasize the value of a differential leucocyte count and especially of a monocytosis, 4 per cent. being considered the healthy average, 5 per cent. suspicious, and 6 per cent. and over proof, except in certain specified conditions, of a protozoal infection.

A SIMPLIFIED TECHNIQUE FOR CULTURING MALARIAL PARASITES AEROBICALLY.*

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To Bass belongs the credit of demonstrating for the first time that malarial parasites can be cultured in vitro: Bass and later on Bass and John's technique being complicated, the author of this memoir devised and published the details of a simplified technique for culturing hæmosporidia where one could operate even with small quantities of infected blood. Later, Sinton described a similar but a more elaborate method

* This paper forms a part of the investigation undertaken under the auspices of the Indian Research Fund Association "1927-1928."

where he used hydrocele fluid in the place of blood serum. All these methods yield only one good culture, and although a continued sub-culture appears theoretically simple, in practice, it always ends in failure; the reason for this will be described in a separate memoir. A satisfactory growth of the parasites even in the first and the only culture, being the important thing for an accurate study of the developmental and

was a relief to find that although with a constant temperature of 40°C. one could obtain various stages of development with almost mathematical accuracy, the laboratory temperature yielded cultures, which, while of distinctly slower growth, were otherwise quite good both in richness and quality.

This slightly delayed development was found to be even of some advantage as it gave one

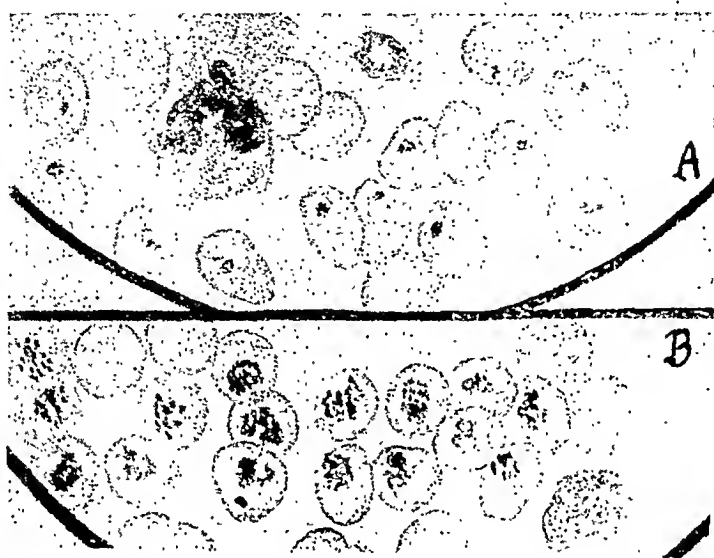


Fig. I. A & B.



FIG. I: *Plasmodium falciparum*.

Fig. I. C.

- " A. 48 hours culture.
- " B. 72 hours culture.
- " C. 72 hours culture, phagocytosis.

All these were seen in one field.

other details, it was found desirable further to simplify the technique in such a way that one could plant the culture tubes even at the bed-side and handle the culture subsequently at ease. The first thing to ascertain was if one could do away with the use of uniform temperature, e.g., that of the incubator, and depend on the laboratory temperature in Bombay, 87° to 90°F., and it

more time and greater ease for observation; thus the malignant tertian parasites took 72 hours or more, from the ring stage to complete schizogony, instead of 48 hours, and the benign tertian required 48 hours or more instead of 32 hours, when left outside the incubator.

The second more important detail was to see the effects of eliminating the anærobic part of

the apparatus and putting up the culture in a stand and to our surprise this procedure had hardly any deleterious effect on the yield or quality of the culture. The essential requisites for a culture are the flat-bottomed micro-culture tubes, described in the previous memoir, and an adequate mixture of glucose solution in the nutrient medium which consists of a serum not necessarily fresh or autogenous.

The flat-bottom in a culture tube seems to afford the best chance for the blood corpuscles to be deposited in a thin layer where the parasites develop better in open formation than in the crowded and dense deposit as is obtained in

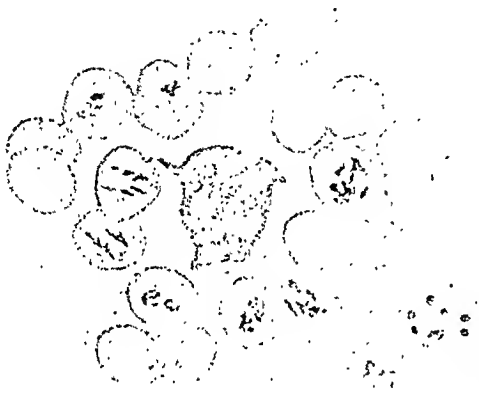


FIG. II.

FIG. II: *Plasmodium falciparum* 24 hours.
All seen in one field; chemotaxis.



FIG. III a.

a round-bottom test-tube. Further, the leucocytes which are inevitably introduced get far less chance for phagocytosis of developing forms when they are sparsely distributed on the surface of this parasite-laden layer, than when massed together as they are in a test-tube; and the shape of the culture tubes is admirably suited to give the largest surface for the deposit with the best economy of the glucosed blood serum.

The following is the method in detail:—

1. Prepare previously (one or two days or even longer) a series of culture tubes ready for planting, i.e., by charging these with glucosed serum $\frac{1}{2}$ inch deep.

2. Puncture finger and with a pipette collect 3 or 4 drops in a sterile test-tube; shake this vigorously so as to defibrinate the blood taken.

3. Introduce one or two drops of this defibrinated blood into each of the micro-culture tubes. Set these upright in a stand, and put this stand away in a dark place.

All manipulations are to be carried on aseptically.

The deposit is ready for examining 12 to 24 hours, etc., after the planting.

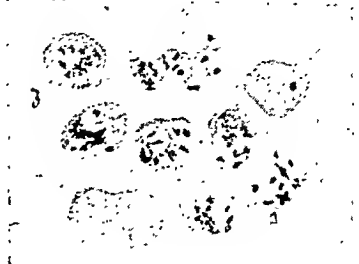


FIG. IIIb.

FIG. III: *Plasmodium vivax*.

- " a. (1) in smears of peripheral blood.
" (2) 36 hours culture.
" b. 48 hours culture.

The accompanying photographs will speak for themselves regarding the value of this simplified technique.

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PLASMOQUIN IN THE TREATMENT OF MALARIA.

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THE Calcutta Police staff, like the Calcutta public, are not free from attacks of malaria, and more than 10 per cent. of all the cases admitted into the hospital with fever prove to be malarial infections. Although it is more common among the new recruits who generally come from up-country, it is also found to occur among such members who have not been out of the city for years together. Some of these get relapses in spite of treatment and have to be admitted into the hospital again and again. To avoid these relapses the routine treatment adopted here for every case is to give an initial purge and then a course of quinine or cinchona febrifuge, 30 grains daily in three doses for seven days, the fever generally subsiding within a day or two, and then after a period of interval for 3 or 4 days without quinine, another purge followed by a

second course of quinine or cinchona treatment in similar doses for about 7 days, before the patient is discharged. One cannot keep these people off-duty for any great length of time, so this plan of treatment was introduced by Major J. C. De to get the maximum effect within a minimum amount of time, and in most cases it answered very well. Of course, all possible precautions were taken to see that the quinine was actually taken in each case. The mixtures were administered by the compounders often in the presence of medical officers and each patient's urine was tested for quinine by Major De himself. There was no escape from taking quinine because everybody knew that he would be punished if his urine was found to contain no quinine. Relapses were now fewer than before, but yet there were cases that would relapse in spite of all precautions. These were generally benign tertian (*P. vivax*) infections. Since such promising reports were published about Plasmoquin and its superiority over quinine in the treatment of benign tertian and quartan malaria and their relapses, and also about its effects on the malignant tertian crescents that are not amenable to quinine (*Ind. Med. Gaz.*, August, 1927), it was at once decided to test this drug in our hospital only in suitable and selected cases, such as the obstinate relapses and the crescent-carriers. For this purpose, only the pure Plasmoquin tablets

gr. 1/3 each, were used. Each case was definitely diagnosed before being chosen for trial and the results were recorded by regular temperature charts and repeated examinations of blood in thick and thin films. Some private patients were also treated in the same way later on by one of the writers and the results were recorded, being of special interest. The reports of these cases are given here in tabulated form, the temperature charts have been intentionally omitted, and notes on cases of special interest are given below the tables.

Case No. 1 had been admitted 5 times for relapses and parasites were found each time in spite of regular treatment. He had enlargement of liver and persistent jaundice each time. During the last relapse, Charcot-Leyden crystals were found in the stools, and besides the quinine treatment he was given 18 injections of emetin gr. 1/2 each. The fever still continuing, 2 injections of quinine bishydrochloride grs. 10 each, intramuscularly, and later on 3 more injections were given. After all this, the fever dropped but jaundice persisted. Plasmoquin was now given and the jaundice gradually disappeared after this. He has had no relapse of fever since then.

Case No. 10 was suffering from fever for about 2 months and was treated for kala-azar in the mofussil on clinical diagnosis. Blood examination revealed the presence of benign tertian

TABLE I.

Cases of pure Benign tertian infection, some of them being of Relapsing Nature.

No.	Caste, sex and age.	PREVIOUS QUININE OR CINCHONA TREATMENT.		PLASMOQUIN TREATMENT.			Days of fever during the treatment.	How many days parasites were seen after Plasmoquin was started.	Untoward symptoms following its use.	REMARKS.
		Days.	Amount.	Days of treatment.	Days of interval.	Total amount.				
1	H. M. adult	59	1,770 grs.	6	..	6 grs.	..	..	..	Had no relapse since treatment.
2	E. M. adult	2	60 "	6	..	6 "	..	..	..	See note.
3	H. M. adult	..	..	6+2	3	8 "	2 1/2	3	..	No relapse.
4	H. M. adult	..	..	5+4	4	9 "	1 1/2	..	..	No relapse.
5	H. M. adult	..	..	4+2	5	6 "	1	..	..	No relapse.
6	H. M. adult	14	420 "	5+5+5	5+3	15 "	1 1/2	..	..	No relapse.
7	H. M. adult	16	480 "	5+4	10	9 "	..	..	..	No relapse.
8	H. M. adult	13	390 "	5+5	5	10 "	..	..	..	Had an attack of dysentery during the interval.
9	H. M. adult	15	450 "	5+4	4	9 "	..	..	..	No relapse.
10	H. F. 18	Indefinite	..	5	..	5 "	2 1/2	..	Cramps in abdomen on 5th day of treatment.	No relapse.
11	H. M. Ch. 6	..	..	5	..	2 1/2 "	2 1/2	..	..	No relapse.
12	H. M. 22	Indefinite	..	21	8	21 "	2	..	..	No relapse.
13	H. M. adult	..	..	21	8	21 "	1 1/2	..	..	Previously treated with urea-stibamine on presumption of kala-azar.

TABLE II.

Cases of Malignant tertian infection in which Crescents were found; either on admission or during Quinine treatment.

No.	Caste, sex and age.	PREVIOUS QUININE OR CINCHONA TREATMENT.		PLASMOQUIN TREATMENT.			Days of fever during the treatment.	How many days parasites were seen after Plasmoquin was started.	Untoward symptoms following its use.	REMARKS.
		Days.	Amount.	Days of treatment.	Days of interval.	Total amount.				
14	M. M. adult	12	360 grs.	5	..	5 grs.	..	2	..	Originally a case of kala-azar. (See note.)
15	H. M. adult	4	120 "	5+5	7	10 "	..	2	..	
16	H. M. adult	10	300 "	5+5	3	10 "	..	5	..	Case of blackwater fever. (See note.)
17	H. M. adult	10	300 "	5	..	5 "	..	1	..	
18	M. M. adult	6	180 "	5	..	5 "	..	1	..	
19	H. M. adult	3	90 "	6	..	6 "	..	1	..	
20	H. M. 28.	1	5 "	14	..	11 "	4	..	..

TABLE III.

Cases of mixed Malignant tertian and Benign tertian Infection.

No.	Caste, sex and age.	PREVIOUS QUININE OR CINCHONA TREATMENT.		PLASMOQUIN TREATMENT.			Days of fever during the treatment.	How many days parasites were seen after Plasmoquin was started.	Untoward symptoms following its use.	REMARKS.
		Days.	Amount.	Days of treatment.	Days of interval.	Total amount.				
21	H. M. adult	10	300 grs.	5	..	5 grs.	..	1 (only crescents)	..	....
22	H. M. adult	10	300 "	5	..	5 "	..	..	..	(See note.)
23	H. M. Ch. 4	..	..	7+7	3	7 "	2+2	..	..

TABLE IV.

Cases of pure Quartan Infection.

No.	Caste, sex and age.	PREVIOUS QUININE OR CINCHONA TREATMENT.		PLASMOQUIN TREATMENT.			Days of fever during the treatment.	How many days parasites were seen after Plasmoquin was started.	Untoward symptoms following its use.	REMARKS.
		Days.	Amount.	Days of treatment.	Days of interval.	Total amount.				
24	H. M. 40	Indefinite		8	..	8 grs.	1	..	..	No relapse.
25	H. M. 35	Indefinite		8	..	8 "	1	..	..	No relapse.

trophozoites. Plasmoquin was given for 3 days only. On the 5th day she took it on an empty stomach in spite of warning, and began getting violent cramps in the abdomen. Plasmoquin was discontinued forthwith and the pain disappeared. It was tried again after 2 days and the cramps appeared again. The treatment was, therefore, abandoned and no quinine was given, but she has had no more fever since then. The patient was of marked neurotic temperament.

Case No. 15 was originally a case of kala-azar and was being treated with injections of ureastibamine. He had a latent malignant tertian infection which flared up with a sharp rise of temperature towards the end of treatment when he had been altogether afebrile, and malignant tertian rings and crescents were found in the peripheral blood. The total W.B.C. count at this time was 3200 per c.mm. After giving him quinine for 4 days, Plasmoquin was administered for 10 days with an interval of 3 days, to get rid of the crescents. After Plasmoquin, the W.B.C. count rose to 6200 per c.mm.

Case No. 20 came in for treatment of blackwater fever that had followed a dose of quinine. After the usual measures and alkaline treatment, this condition was cured but he began getting fever again. He was given half a tablet of Plasmoquin Co. (Plasmoquin g. $1/24$ + Quinine gr. $\frac{1}{2}$) every 6 hours, and the dose was cautiously increased till after 3 days he could tolerate 3 tablets at a time thrice daily without showing any symptoms.

The fever was normal from the 5th day and this dose was maintained for two weeks without any break.

Case No. 23 a child was brought with history of fever for 4 months, intense anæmia, spleen and liver $++$. He had had no quinine treatment so far and would take no bitter medicine. Numerous benign tertian trophozoites were found on examination and one solitary ring was seen which was taken to be a benign tertian ring. He was given Plasmoquin $\frac{1}{2}$ tablet thrice daily for 14 days with a break of 3 days. The fever dropped very quickly but a week after the treatment had stopped, he began getting fever again, and many malignant tertian rings were now seen in the peripheral blood. He was given two intramuscular injections of quinine grs. 5 each, and the temperature dropped with no further relapse.

Conclusions.

From our experience in the course of a year regarding the effects of Plasmoquin in the cases cited above and also in several other unrecorded cases we can conclude that—

(1) Plasmoquin has its own sphere of action in the treatment of malaria. It can cure a case of benign tertian or quartan infection more quickly, more steadily and more easily than quinine. All our cases responded very quickly to the treatment and none had any recurrence of fever afterwards. It acts in very small doses, and being tasteless can easily be

taken by children. In these respects it has a great future in this country, but its value may not be fully appreciated until the use of the microscope becomes more popular and the different types of malaria are properly diagnosed.

(2) It cannot claim to replace quinine. It has no action on the asexual forms of malignant tertian parasites as has been conclusively shown in case 23. It has been observed that if there is a malignant tertian infection super-imposed upon a benign tertian or quartan infection and this is overlooked, Plasmoquin will fail to produce the desired effect.

(3) Hence only those who have facilities to distinguish the different types of malaria by the examination of blood, can make a choice between quinine and Plasmoquin for the respective cases. For the mofussil doctor who depends upon clinical diagnosis it is not safe to rely upon Plasmoquin alone. He can use it in addition to quinine and would surely get better results than with quinine alone, specially in the subacute and chronic cases so commonly met with, which are generally benign tertian infections, either pure or mixed. It is in those cases of characteristic tertian and quartan types of fever where the one day or two days' periodicity is kept up with clock-like regularity that Plasmoquin can be used without blood examination. But even then it is not always wise to judge the nature of the infection by guess work.

(4) In cases of malignant tertian infection also, it may be given along with quinine. The crescents that are generally formed in these cases before long, are destroyed and the spread of the infection checked. If it is universally used in addition to quinine the continuous infection and re-infection in the endemic areas would be materially reduced as there would be very few gametocytes for the mosquitoes to carry.

(5) The drug may be used without much risk. In none of the cases under our observation was there any untoward effect or toxic symptom noticed after its use except in a neurotic patient where there were cramps in the abdomen on the 5th day of its use.

(6) The Plasmoquin Co. tablets, containing both Plasmoquin and quinine, are meant to act like a double-edged sword for the undifferentiated and mixed cases of malaria. These can be given in such cases where blood examination is not possible, where a bitter mixture is abhorred and where there is no urgency for vigorous treatment. In cases of blackwater fever these are well worth a trial. As these tablets contain very small amounts of quinine and Plasmoquin, the dose can be cautiously regulated and increased and the intolerance gradually overcome. In cases of idiosyncrasy to quinine, these may also be of considerable value.

Our grateful thanks are due to Major J. C. De, I.M.S., who took an active interest in these investigations and to Major Malaya, Police Surgeon, for his kind permission to publish the reports.

A Mirror of Hospital Practice.

TYPHUS-LIKE FEVER. (COLONEL MEGAW'S TICK-TYPHUS?)

By G. GHOSE, M.B., B.S., D.T.M.

Lukerganj, Allahabad.

Case No. 1. Mr. F. G. J., aged 20 years, an English missionary from Mirzapur was admitted to the European Civil Hospital at Allahabad, on the 28th March, 1928. He came to India in October, 1927, and has been working in the B. C. M. S. mission at Mirzapur. On his arrival in India, he had a prophylactic inoculation of T. A. B. vaccine.

On Friday, the 23rd March, 1928, he felt a bit out of sorts and found that he was unable to carry on his usual work. On Saturday he had headache and was feeling seedy and found that he could not read on account of pain in his eye-balls. On Sunday morning he woke up with a temperature of 102.6° and felt "a chilly tremor up and down the body." The temperature gradually rose till on Tuesday evening it reached 104° . He was suspected to be suffering from malaria and was given two intramuscular injections of quinine by the doctor of the mission at Mirzapur. The injections did not bring the temperature down. He noticed a rash on the dorsum of his hands and wrists on Wednesday and came to Allahabad the same day and was admitted to the European Civil Hospital, here.

On or about the 20th March, 1928 (the patient does not exactly remember the date), he was bitten by some insect on the inner aspect of his left leg. The site of the bite was inflamed and tender for some days. (See the accompanying photograph).

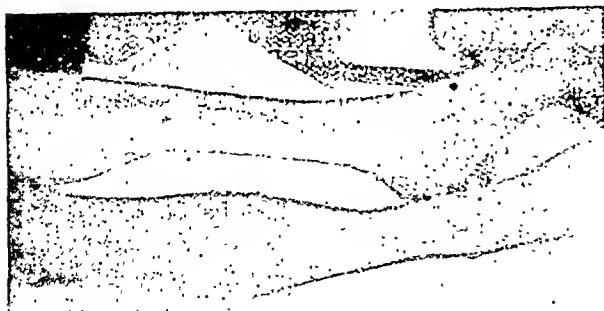


Fig. 1.—Mr. J., 9th day. Left leg showing the site of bite.

He has four dogs and lives away from the city (Mirzapur) proper, where he says, lots of grazing cattle roam about.

Condition of the patient on admission:

1. *General appearance.*—Face flushed, temperature 102.2° . Patient complained of headache and pain all over his body. Eyes slightly red.

2. *Alimentary system.*—Tongue—very thickly coated.

Bowels—regular; no tympanites.

Spleen and Liver—not palpable.

3. *Respiratory system.*—Nothing abnormal.

4. *Urine.*—Colour—deep amber.

Sp. gravity 1028

Reaction acid

Albumen nil.

Sugar nil.

5. *Circulatory system.*—Heart sounds—normal.

Pulse—slow, as compared with temperature.

Blood Examinations.

(a) No malarial parasites found.

(b) Differential count—

Polymorphs .. 57 per cent.

Lymphocytes .. 40 "

Large mononuclears .. 3 "

Eosinophiles .. 0 "

(c) Total white blood count—12,000 per c. mm.

(d) Blood for Widal was taken on 31st March, 1928.

Result—completely negative to *B. typhosus*, *B. para A* and *B.*, in all dilutions.

Rash.—The rash appeared on the 4th day of



Fig. 2.—Mr. J., 9th day

the disease and was at first noticed on the dorsum of the hand and wrist. During the course of a day or two the rash spread over the whole body. Some spots of the rash were round while others were oval. The size varied from 2 mm. to 8 mm. in diameter. The rash was partially macular, partially papular (i.e., slightly raised from the general surface of the body so that the spots could be felt by the fingers with eyes closed). They were scattered all over the body and were discrete. In the early part of the disease they faded on pressure but later on, some of them did not fade on pressure and were definitely petechial in character. On the face there were only a few spots. With the subsidence of fever the rash began to fade and disappear. The patient left the hospital on 11th April, 1928, when the rash was still visible as brownish red on purplish pigmented spots.

Case No. 2.—A European lady, Mrs. R., aged about 50 years and living in Allahabad, got fever on Friday the 2nd March, 1928. About a week before this she was bitten by some insect while

she was sitting on her verandah at about 3 p.m., on the lateral aspect of her right arm about 2 inches above the elbow. The site of the bite became extremely painful, red and angry-looking and in a day or two the right axillary glands swelled a little and were tender on pressure. A painful cord-like swelling could be felt from the site of the bite right up to the axillary glands on

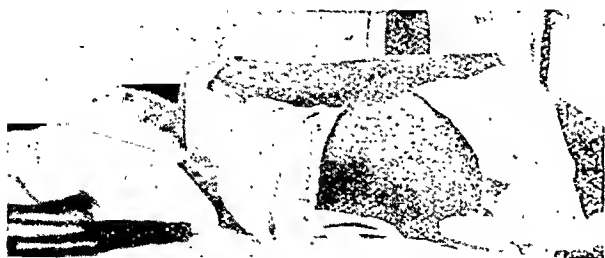


Fig. 3.—Mrs. R., photograph taken on the 16th day of the disease.



Fig. 4.—Mrs. R., 16th day.

the same side. The patient could not say what insect bit her. She is very fond of animals and has 7 long-haired dogs. The house where she lives is surrounded by trees and a garden, and is situated away from the city (about 2½ miles).

The fever was accompanied by rigor and pain all over the body. The pain was worst in the wrist joints (both). The fever on the first day was 101° and gradually it rose to 104° in the course of a few days.

Rash.—A macular rose-red rash appeared on the 5th day of the disease (Tuesday, 6th March, 1928), over the extremities and in the course of a day or two, spread all over her body, there being only a few spots on the face. The spots at first faded on pressure but later on many of them became petechial in character. The size varied from 2 m.m. to 12 m.m. in diameter.

Condition of the patient on 8th March, 1928, (7th day of the disease).

1. *General appearance.*—The patient seemed to be drowsy and was said to be sleeping all the time. Face flushed. Eyes very much congested and red. She complained of photophobia and pain in her eye-balls. Temperature—103.6°. Whole body covered with a rose-red macular rash. Some of the spots were slightly raised and partially papular in character. Many of them were petechial in character.

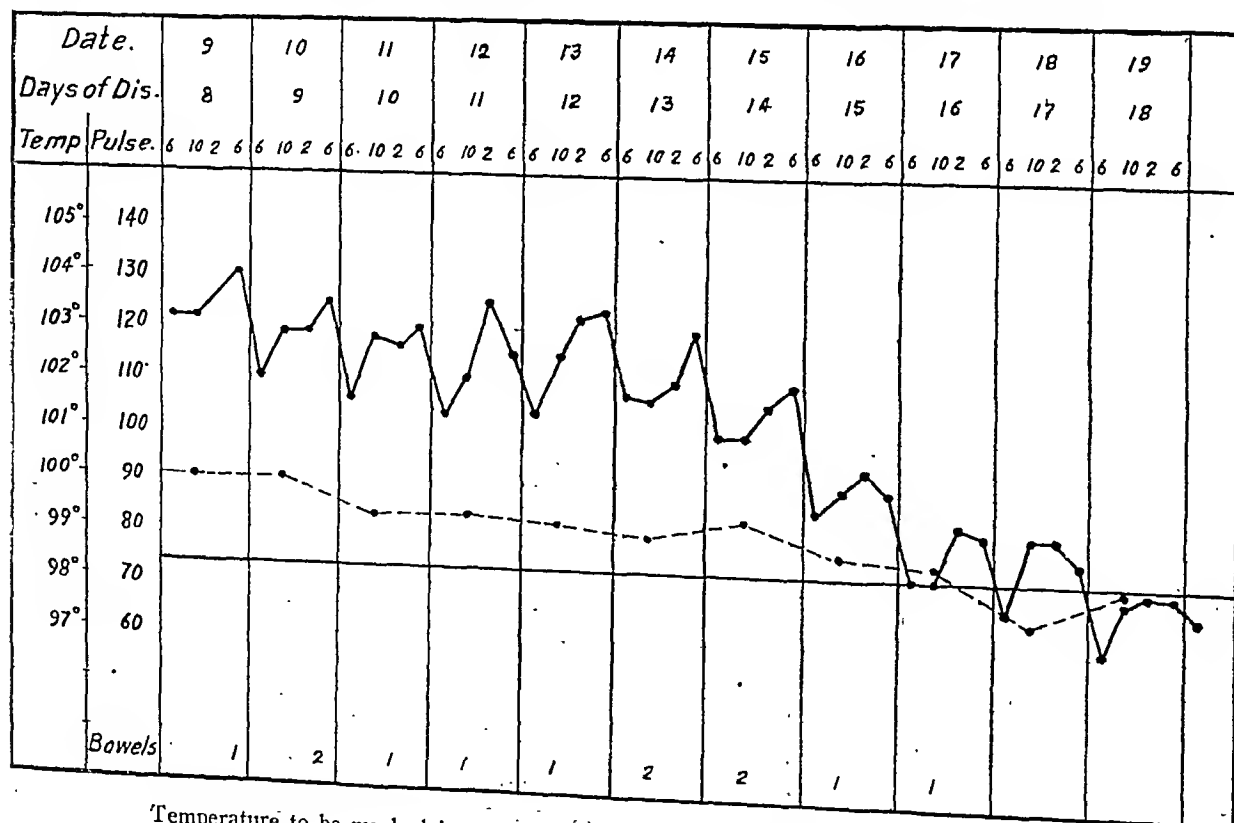
2. *Alimentary system;*
Tongue—very thickly coated.
Spleen and liver—not enlarged.
Bowels—regular.

3. *Respiratory system.*—A few crepitations at the bases of lungs.

4.—*Circulatory system.*—A systolic murmur heard at the apex. Pulse 90 when temperature was 103°.

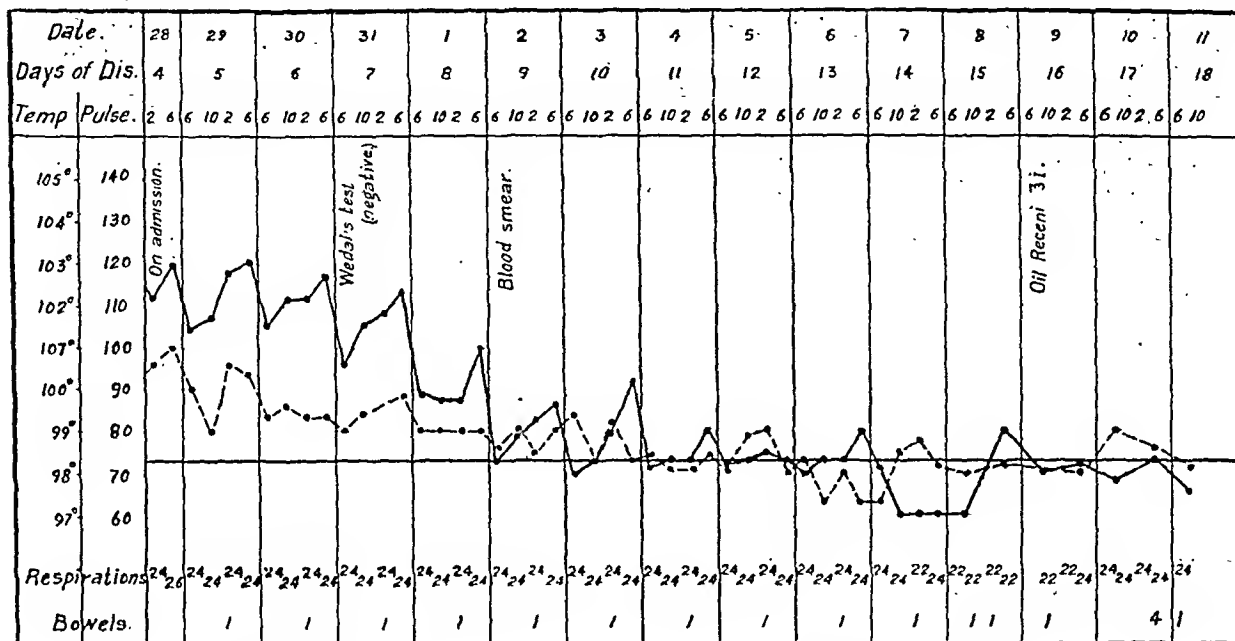
Blood Examinations.

(a) No malarial parasites found.



Temperature to be marked in —

Pulse to be marked in - - - - -



Temperature to be marked in —

Pulse to be marked in - - - - -

(b) Differential count—

Polymorphs	..	61 per cent.
Small mononuclears	..	32 "
Large mononuclears	..	6 "
Eosinophiles	..	1 "

(c) Total white blood count—about 11,000 per c. mm.

5. *Nervous system.*—The patient was drowsy. There was pain all over the body. She complained of pain in her eye-balls, photophobia and severe headache.

6. *Site of bite.*—A dark, reddish-brown, tender area could be seen, which was covered with a scab; it was about $\frac{1}{4}$ inch in diameter and was situated on the lateral aspect of the right arm, about 2 inches above the elbow. A tender cord-like thickening could still be felt extending from the site of the bite to the right axilla. The axillary glands were slightly enlarged and tender on pressure.

Course of the Disease.—The temperature came down to normal on the 18th day of the disease by lysis. The marks of the rash persisted for a long time and some of them are still visible on the extremities as brownish-red pigmented spots. During the course of the fever she bled profusely from the nose 2 or 3 times. She was last seen on the 12th of April, 1928.

(A third case of typhus-like fever described by Dr. Ghose, was incorporated in the article entitled "Tick-Typhus and other Sporadic Fevers of the Typhus Group." By Col. Megaw and published in the June 1928 issue of this journal. Editor, *Indian Medical Gazette.*)

CEREBRAL SYMPTOMS ASSOCIATED WITH FILARIA.

By THA MYA, M.B.

Assistant Surgeon, General Hospital, Mandalay.

MAUNG WE, a Burmese Christian, aged 40 years was admitted into the Mandalay General

Hospital on 20th June, 1928, for unconsciousness of four hours' duration. No history was available and the following conditions were found on admission. The patient was unconscious and restlessly rolling in bed. The right arm was flexed, twitched now and again, followed by stiffening of the extremities for a short while. There was no lock-jaw nor any injury to the head. Temperature was 98.4, pulse 64 and respiration 24. Heart sounds normal; lungs clear; liver and spleen not palpable below the costal margin. Pupils equal and reacted to light. Passed urine in bed. Blood examination—no malarial parasites were found. Urine drawn by catheter showed—reaction neutral, albumin and sugar nil. Blood pressure could not be taken properly as the patient was very restless. Lumbar puncture was performed and the fluid, which came out under pressure, was bloody. About 20 c.c. of the fluid was removed. The patient became more quiet. Blood pressure was taken with the following result:—Systolic pressure 160 m.m. of Hg. and the diastolic 90 m.m. of Hg. It was provisionally diagnosed as a case of cerebral hæmorrhage. Ice-cap was applied continually to the head. Calomel grs. v was given by mouth and retained. Enema was given and a large amount of fecal matter was passed. The patient lay quiet in bed on his right side. On 21st June, 1928, right-sided hemiplegia present. Patient was semi-conscious. He half opened his eyes when called and again went off to sleep. Temperature sub-normal, pulse good, 80. Patient quiet in bed. Takes feeds. Passed urine and feces in bed.

On 22nd June, 1928. Condition same. Catheter passed twice.

On 23rd June, 1928. Patient restless, turning constantly from side to side in bed, head retracted, no Kernig's sign present. Temperature 103 per rectum, pulse 108, respiration 28, in the forenoon. Ice-cap applied continually.

In the afternoon patient still restless, temperature 101, pulse 114 and respiration 70. Râles heard all over the lungs on both sides. Heart sounds normal. Lumbar puncture performed and the fluid that squirted out under pressure was bloody. The fluid was sent to the hospital laboratory for examination. After lumbar puncture the patient became more quiet. Enema given with good result. Ice-cap continued. Blood pressure taken and systolic pressure was found to be 160 m.m. of Hg.

Patient died at 12-45 a.m. on 24th June, 1928.

Laboratory reported that filarial larvæ were found in the fluid. No other micro-organism present.

I am grateful to the Civil Surgeon, Mandalay, for kindly giving me permission to publish this case.

TOXIC SYMPTOMS FOLLOWING ADMINISTRATION OF CARBON TETRACHLORIDE.

By A. C. MITRA,

Sub-Assistant Surgeon, Motihari Jail, Motihari.

PRISONERS of Bihar and Orissa Jails, on their admission, are treated by carbon tetrachloride till they are free from ankylostomes. On 20th July, 1928, a batch of six prisoners was given carbon tetrachloride, 45 minims each at 7 a.m., an hour and a half after their early morning meal of *ketchihri*. One of them, a prisoner of good health with hard labour, weighing 116 lbs. with a height 5 feet 4 inches and 30 years of age, felt nausea one hour after the administration of the drug and in a few minutes he commenced vomiting. He was seized, soon after, with a colicky pain in the abdomen and was restless. Perspiration started on the forehead, pulse was soft and slow and respiration laboured. Urticarial eruptions on the body appeared 20 minutes after the colic, these were at first discrete but soon became confluent and the whole body was bloated up. All these happened within two hours after the administration of carbon tetrachloride.

The prisoner was at once put to bed and pituitrin 0.5 c.c. injected, and mag. sulph. $\frac{1}{2}$ oz. in solution given by the mouth. The pulse improved after the injection. The prisoner had a good action of the bowels by 11 a.m. and was relieved of colic. The eruption disappeared completely by 2 p.m. and he was all right and returned to work the same evening. On examination of the stool, ankylostoma and round worm ova were found.

As none of the prisoners, a little over three thousand, treated by me ever exhibited such signs and symptoms, I beg to enquire if such a thing has been noticed before and what it was due to. Was this due to idiosyncrasy of the man to the drug or to the presence of a mixed infection? Several cases of mixed infection have been treated by carbon tetrachloride without such manifestations.

(We have shown the above paper to Dr. P. A.

Maplestone, Hookworm Research Department, The School of Tropical Medicine and Hygiene, Calcutta, who comments as follows:—

"The symptoms reported in the above case are somewhat atypical of carbon tetrachloride poisoning, especially the severe colic and the extensive urticaria. These symptoms are occasionally associated with ascaris infection. It therefore seems probable that the carbon tetrachloride stimulated the ascaris to emit a toxin, which caused the symptoms. As the above report points out, it is difficult to see why this should occur in one case infected with ascaris and not in all. This is no more capable of explanation in our present state of knowledge, than why, when ascaris infection is very common, it is very rare to meet cases with signs of toxæmia definitely due to this infection, although there is no doubt that such cases occasionally occur."—EDITOR, *Indian Medical Gazette*.)

DIGITALIS WITH SPECIAL REFERENCE TO AURICULAR FIBRILLATION.*

By P. V. KARAMCHANDANI,

CAPTAIN, I.M.S.,

Officer Commanding, Indian Military Hospital, Pishin.

THE essential feature in auricular fibrillation is over activity in the cells of the sino-auricular node, resulting in a machine-gun-like multiplicity of stimuli passing in such quick succession that only a few are effective in stimulating the atrio-ventricular node and ventricular contraction. The rate of ventricular contraction depends upon the degree of sensitiveness of the atrio-ventricular node and its power of response to the stimuli.

Our object, therefore, in such cases should be to decrease the sensitiveness of this node and thereby produce a sort of partial block, in order that while the auricles may continue to fibrillate the ventricles may slow down. This ensures better myocardial circulation and in course of time helps the auricles to recover as well. The effect of digitalis in such cases for the time is immediate, but the ultimate prognosis depends upon the myocardial condition.

The dose of digitalis varies in different cases, but it may be remembered that in cases of fibrillation, it has to be pushed to the physiological limit. Out of 5 cases, the following case in which as much as 1/10th grain of digitalin by injection and dr. 1 of digifortis (Parke, Davis and Co.) had to be administered per diem, will illustrate the above statement.

No. 6413, Sepoy J., was admitted to this hospital on 23rd March, 1928, for lobar pneumonia. On admission, his heart was regular, beating 120 times per minute. On 25th March, 1928, at 9 a.m., he developed auricular fibrillation with the result that his pulse which could be felt at first, became very irregular and subsequently it was quite imperceptible, the apex was beating 208 times per

* Published by kind permission of the Director of Medical Services in India.

minute. Subcutaneous injection of 1/50th grain of digitalin with dr. ½ tinct. digitalis by mouth along with detoxicating treatment of pneumonia, restored the heart and the pulse to rhythmic regularity.

The temperature came down to normal on 1st April, 1928 and on 9th April, 1928, it was 98.4°F, pulse 72, respirations 18 per minute. There being no contraindication, the patient who was clamouring for other diet than milk, was permitted bread, vegetables, chicken and fruits, on 11th April, 1928. On 13th April, 1928, at 8 a.m., he suddenly developed auricular fibrillation. I was summoned immediately and when I saw him he was at his last gasp. Dyspnoea was intense, respirations being about 64 per minute, the chest was full of congestion crepitations, the surface of the body was cold, perspiration was profuse over the forehead, the pulse was imperceptible and the apex was beating over 275 per minute, there was intense thirst and the conjunctivæ were ashy in colour. I at once gave him digitalin grain 1/50th subcutaneously and tinct. digitalis dr. ½ orally, and within half-an-hour he turned the corner and all symptoms of heart failure disappeared dramatically. The pulse rate, however, continued to be 125 per minute. He was given digitalin grain 1/10th in 5 doses of grain 1/50th by injection, and dr. 1 of digifortis (Parke Davis and Co.) in 3 doses of in 20. The injections were continued up to next mid-day (14th April, 1928), when they were stopped as it was considered that digitalis orally should have commenced operating. He developed a third attack at 8 p.m. on 14th April, 1928, but it yielded to the injection of digitalin which had to be continued, grain 1/50th 5 times a day. The pulse rate, however, never came down below 120 per minute.

He had a fourth attack at 10 a.m. on 16th April, 1928, and the fifth and last at 10 p.m. the same evening. Two hypodermic injections of 1/50th grain digitalin at 10 p.m. and 12 midnight failed to produce any effect, the patient became unconscious at 1-30 a.m. and died at 2 a.m. on 17th April, 1928. It may be noted that he showed no symptoms whatsoever of toxicity, drowsiness, headache, nausea, vomiting or diarrhoea arising from overdose of digitalis. How digitalis actually acted in this case may be explained as follows:—

When the heart showed signs of failure, the lack of circulation in various organs made them raise a cry, which, reaching the heart through the sympathetic, increased the rate of its beats. But this increase in the rate of beats decreased the efficiency of the heart by shortening the period of recovery or recharging of vital energy in the cell, thus establishing a vicious circle. The less the efficiency of the heart, the less the amount of blood in the organs, the greater therefore their cry and the greater the sympathetic stimulation resulting in still more rapid action of the heart and a still further lowering of its

efficiency. Digitalis at this juncture by counteracting the sympathetic effect gave time to the nodal cells to recover, which brought about slowing of the heart with consequent prolongation of diastole. The rapid and inefficient cardiac contractions were replaced by slow and efficient ones and the patient recovered. Of course, the ultimate recovery depended upon the condition of the myocardium and in this case it being degenerated, digitalis ultimately proved powerless.

A CASE OF RENAL CALCULI AT THE WEST HOSPITAL, RAJKOT.

By J. F. HENRIQUES, L.M. & S., B.M.S.

Officer-in-charge, West Hospital, Rajkot.

A YOUNG Hindu woman, age 20 years was admitted for a supposed tubercular sinus on the left side of her waist. Carious bone was felt on probing and it did not seem to be connected with the spine. The sinus was enlarged and a portion of the rib resected which seemed to be necrosed. Anteriorly there was still felt on probing some hard object and on digital exploration calculi were found, six entire uric acid stones were removed and a couple were brought out in pieces. The entire kidney seemed disorganised. The wound was very foul and septic and there was a urinary discharge from it, after the operation; but it is now granulating. It may leave a sinus or necessitate removal of the bad kidney, at some future date. It was strange there was no urinary discharge from the sinus before the operation, nor any history of renal colic.

A CASE OF "ECLIPSE BLINDNESS."

By S. C. SEN GUPTA, L.M.F.,

Resident Medical Officer, Lakhipara Tea Estate, Banerhat P. O., Jalpaiguri District.

W. C., a Hindu male, aged 28 years, clerk, came to me for treatment and expressed himself as follows:—

"I lost my wife 1½ months ago. Since then on account of constant weeping my eyes became weak. A week back I went along with my friends to the river to see the solar eclipse. I looked towards the eclipsed sun pretty constantly four or five times with unprotected eyes. Soon after my last attempt to see, my vision became hurred and after a couple of minutes all was dark, and I became totally blind.

I consulted a native *hakim* and after 3 days treatment my vision improved a bit, so much so that I could walk about and find my way. But since then a black object looms in front of my eyes and is surrounded by a bright circle in which I sometimes see rainbow colours. Objects in front of my eyes are obscured by that dark spot, but through the bright circle I can perceive things on the right and left very dim."

Objective examination in the daylight revealed nothing.

Subjective examination.—The patient was asked to read test type; he could not read, but could perceive a hand when moved in front of his eyes at a distance of 2 feet. There was no central vision.

He was examined in the dark room after dropping atropine solution, 2 per cent; with indirect ophthalmoscopic examination, the blood vessels entering the optic disc were seen to be somewhat congested. In the region of the macula-lutea a definite reddish brown discolouration was seen, except which there was nothing worthy of note.

The *diagnosis* of eclipse blindness was made from the—

- (1) History of seeing a solar eclipse.
- (2) Loss of central vision.

Treatment adopted. General.—The patient was confined to an absolutely dark room, and told to wear smoke-coloured glasses when it was essential for him to go out of the room. Good, nourishing, easily-digested diet was given and Easton's syrup, one drachm in an ounce of water an hour after meals, twice a day, also daily hypodermic injections of strychnine.

Local Treatment.—Sub-conjunctival injections of mercury cyanide, 1 in 2,000, 20 minims, after cocainising the eyes were given on every fourth day, a good deal of local reaction followed the injection and on account of some pain the patient writhed in the bed. Four such injections were given and no improvement resulted. The patient refused to take these injections on account of the very severe pain which he experienced. Then injections of sodium chloride of physiological strength were given instead in the temples daily. After 6 injections his peripheral vision became good, the dark spot in his central vision became dim and the bright circle disappeared. After 4 more injections his vision became clear. He was made to read test type and the vision was found to be 6/12 with both eyes. Local treatment was discontinued at this stage. He was told to wear dark glasses and continue the tonic treatment. After a month he was again seen and then his vision was 6/9; after this he was never seen by me again.

A CASE OF INTESTINAL OBSTRUCTION FOLLOWING A PENETRATING WOUND IN THE ABDOMEN.

By P. N. BASU, M.B., M.R.C.P.E., D.T.M. & H., D.P.H.,
CAPTAIN, I.M.S.,

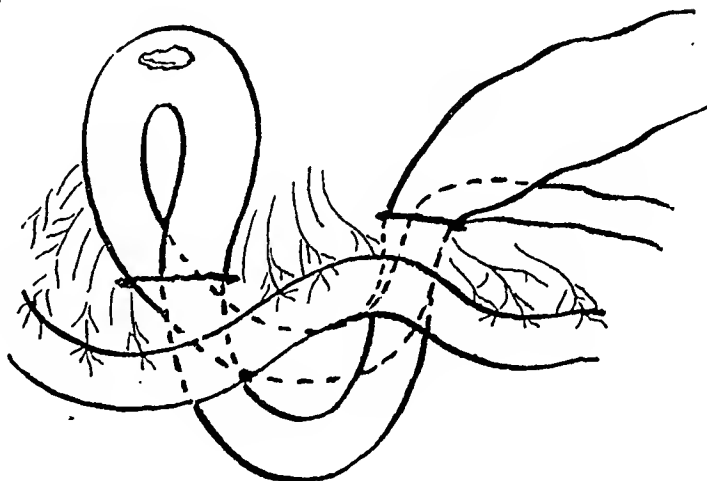
and

T. BHASKARA MENON, M.B., M.R.C.P.,

Department of Pathology, Medical College, Madras.

C., aged 50 was admitted into the wards of the Second Surgeon, General Hospital, Madras, on

19th June, 1928, with a penetrating wound in the right iliac region, alleged to have been caused by a stab with a knife. A loop of intestine which was projecting through had a tear in it of the size of an 8 anna piece.



(Diagrammatic).

Showing the loop drawn out through two tears in the mesentery.

The wound was enlarged under anæsthesia, the peritoneum drained by two drainage tubes put in one on either side of the umbilicus; a Paul's tube was put in through the opening in the projecting loop and this was stitched into the edges of the wound. The patient's condition was not improved and he died on 20th June, 1928.

The autopsy showed that the coil of ileum about 1 foot above the ileo-cæcal junction which was projecting out, had made its way through two tears in the mesentery in succession so that its lumen was completely obstructed. This had caused distension of the whole of the small intestine above this loop right up to the duodenum and the patient had apparently died of intestinal obstruction. There was very little evidence of peritonitis but the peritoneal cavity contained about 2 ozs. of partly clotted blood.

It is curious to note how this ruptured coil had made its way through two tears in the mesentery in succession, since it is reasonable to assume that all the wounds were made by one penetrating stab. One possibility is that the coil of intestine had been pushed in by the knife in its way down through two successive folds of the mesentery and had not dislodged itself with the withdrawal of the knife. Another possibility is that the loop of gut was lying behind all the time and had been pulled out through the two folds of the mesentery by the knife in its egress.

It is extremely unlikely that the ruptured loop had made its way by its own peristalsis through two tears in the mesentery in succession.

The case is also of interest since it brings in the possibility of acute obstruction arising immediately after a penetrating stab wound.

Our thanks are due to Major D'Souza, I.M.S., for permission to report this case.

ELECTRO-COAGULATION (DIATHERMY) IN MALIGNANT GROWTH OF FACE.

By P. P. LALVANI, I.C.P.S. (Bom.),
Civil Hospital, Karachi.

SETH Kimatrai, Hindu, aged 55 years, residence at Ghogharo, District Larkana, Sind.

The patient stated that he developed a small mole, the size of a pea, on the nose about 6 years ago. There was no pain nor did the growth give him trouble in any other way.

During the last 6 months it appreciably increased in size and assumed a diameter of about $2\frac{2}{3}$ inch. He felt that his face was disfigured and for cosmetic reasons he asked a doctor to cut it. This was 3 months prior to his coming to me.

The surgical operation did not help him; cutting made it worse. The wound would not heal and instead more nodules appeared. There was considerable pain which did not allow him to sleep at night.



Fig. 1.

Fig. 1 shows the condition before I did the electro-coagulation. It shows an ulcerated nodular growth involving the nose, and extending on either side to the canthi. There was considerable infiltration in the tissues around. The lymph glands could be felt slightly in the sub-maxillary region.

The case was seen by Lieut.-Col. I. Davenport Jones, M.D., I.M.S., Civil Surgeon, who opined that it was a malignant growth. The nature of the

malignancy could not be determined, as the patient would not allow anything to be cut out for the sake of pathological examination.

On 11th March, I electro-coagulated the entire growth, and also $\frac{1}{4}$ -inch of the surrounding tissues, with the diathermic knife. This was done under novocaine infiltration anaesthesia. As usual there was considerable swelling in the surrounding tissues that very evening. After 4 days the swelling entirely disappeared. Severe pain, which the patient had before electro-coagulation, also completely disappeared in 4 days. The slough took about 2 weeks to detach, leaving a clean healthy ulcer with the nasal bone exposed. The ulcer took about 4 weeks to heal up and the bare nasal bone was covered with granulations.



Fig. 2.

Fig. 2 shows the condition 6 weeks after the electro-coagulation. There is a scar over the area previously occupied by the growth. In the centre there is a little bit of raw surface which would have taken about 3 to 4 days to heal. As the patient had to attend to some important business he went away and I have since heard that the raw surface has completely healed up.

This case was considered as unsuitable for surgical operation, because operation done on him previously had been followed by extension of the growth and also on account of the danger of entropion of the left upper eye-lid as the result of contraction of scar tissue. Diathermic electro-coagulation was, therefore, resorted to in this case with good results.

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NOVEMBER.

WILLIAM HARVEY.

THE greater the man the greater are his potentialities for good or for evil, and in many instances for both good and evil. The influence of many great men has been during their life time almost entirely good, yet much harm has been done in their names through the unreasoning hero-worship of posterity. For fifteen hundred years, commencing from the second century of the Christian era, the teachings of Galen had the most remarkable influence on the practice of medicine. This influence, which extended from Asia Minor and Egypt, throughout Europe and even as far east as India, was for the most part a benign influence, but in the 15th and 16th centuries there was probably no one factor which held up the advance of medical science more than the blind adherence of the leading physicians and teachers of those times to the Galenical principles. The modern tendency is perhaps not to honour the past sufficiently but to us nothing seems more stupid than this unintelligent following of ancient dogma. Were it possible for Galen to come to life again, although he would be at first bewildered, we feel sure that he would be the last man to refuse to accept the evidence of his eyes, aided by comparatively modern inventions such as the microscope and the x-ray tube, even if the demonstrated facts were contrary to his own preconceived ideas. In his own time he was progressive; he did not, for instance, accept the established theory that arteries contained only air, but he looked to see and found that they contained blood.

Fortunately, medical science has now almost freed itself from this yoke of tradition.

At the present day, when nothing delights the scientist more than being able to upset the theories of his predecessors, it is difficult to realise the awe in which the older teachings were held; some realisation of the mental state of the times can be obtained by reading William Harvey's introduction to his epoch-making book, *De Motu Cordis*, published for the first time just three hundred years ago. The preface was addressed to the President and Members of the College of Physicians in London; it was written in Latin; the following is a quotation from a contemporary translation. "Since this only book does affirm the blood to pass forth and return through unwonted tracts, contrary to the received way, through so many ages of years insisted upon, and evidenced by innumerable, and those most famous and learned men, I was greatly afraid to suffer this little book, other-

ways perfect some years ago, either to come abroad, or go beyond Sea, lest it might seem an action too full of arrogance, if I had not first propounded it to you, confirm'd by ocular testimony, answer'd your doubts and objections, and gotten the President's verdict in my favour; William Harvey had announced his "discovery," and he had taught to the students of the time and had discussed with his colleagues at St. Bartholomew's Hospital and elsewhere his theory regarding the circulation of the blood for more than nine years before he wrote this. How very different from the modern method, sending a telegram on the afternoon of the day the discovery is made!

Harvey had the true spirit of the discoverer. He did not accidentally stumble upon the truth, but after many years of careful work he gradually evolved his theory and then proved it to his own satisfaction and to that of his colleagues. With the acuteness to recognise inconsistencies which had escaped his predecessors, the ability to apply the numerous observations which he had made during his life as a practising physician, and the patience to carry out innumerable dissections on dead animals at all embryonic stages of development and experiment on living ones, he had the courage and personality to force his opinions on his contemporaries.

To appreciate fully the value of Harvey's work it is necessary to know something of the state of knowledge on the subject at the time. Aristotle had taught, and his immediate successors had elaborated his theory, that the blood was formed from food in the liver, was carried to the heart and thence distributed to all parts of the body by means of the veins. The arteries carried a vital air or spirit which they had obtained from the lungs and which they likewise distributed throughout the body. Galen, later, showed that the arteries contained blood which, he claimed, was mixed with the vital air. For the next fourteen hundred years there was practically no advance in the knowledge of the subject and at the beginning of the 16th century, although it was realised that the blood was not stagnant, it was thought that its movements were slow and irregular, both in speed and direction; it was supposed that one kind of blood flowed from the liver to the right ventricle and thence through the veins to all parts of the body and to the lungs by the pulmonary artery, and that another kind of blood mixed with vital air which it obtained from the lungs by means of the *arteria venosa* (pulmonary vein), was distributed throughout the body by means of the arteries; and it was believed that the blood from the right ventricle passed through small pores in the septum of the heart into the left ventricle. In those days they had no conception of the motive power of the heart and they considered that the movements of the blood were due to the mixture of blood and air, producing a sort of boiling effect. During the 16th century certain further advances were made, and there is no doubt that

Servetus, who maintained the imperviousness of the septum and described the lesser circulation, i.e., through the lungs, Columbus, who elaborated this theory, and Andreas Cæsalpinus, who observed the swelling below a ligatured vein and from this inferred the return flow of the blood in the veins, laid the foundations of Harvey's great work.

It was in the face of this prejudice against interference with established authority and out of this confusion, in which there were many grains of truth but an enormous admixture of fiction, that Harvey built his almost faultless conception of the most fundamental problem in physiology. In describing the circulation of the blood exactly as we know it to-day he left one small gap; without the microscope, which had not been invented in his day, his only aid to sight being a small hand lens, he was unable to see the capillary circulation which was described by Malpighi some few years after Harvey's death.

DEATHS UNDER ANÆSTHETICS.

We print below an editorial note from the *Dental Surgeon* of 21st July, 1928. It seems to us that the investigators might achieve very valuable results if the medical profession in general will co-operate. The list of questions to which practitioners are asked to reply is also given.

"One of the painful duties that falls to the lot of the editor of a dental paper is the one which is occasionally cast upon him of chronicling the death of a patient under an anæsthetic, or following its administration. It is not suggested that such events are of frequent occurrence, and, bearing in mind the thousands of anæsthetics which must be given daily for dental operations, the cases which have a fatal termination are few and far between. Nevertheless, it behoves everyone in any way connected with the profession to do what is in his power to diminish the number of such deaths, and it has occurred to us that a dental journal has special opportunities of collecting and disseminating information on the subject. Much difference of opinion still seems to exist as to which are the best anæsthetics for dental purposes. Probably there is no one anæsthetic that is the best in all circumstances; and the question why a particular anæsthetic which has proved itself safe and trustworthy in a multitude of cases should occasionally lead to a fatal result is certainly a matter which calls for the closest investigation. From time to time, inquiries have to be held in different parts of the country on persons who have died during, or shortly after, the administration of an anæsthetic for dental purposes. In most cases the information reported in the public press is meagre, and not very illuminating. This is no doubt due to the fact that the lay reporters are not sufficiently conversant with the subject to be able to select

for publication those parts of the evidence which would convey most information to the scientifically-trained mind. It is our hope, by means of a carefully prepared questionnaire, to elicit the essential details from the professional men connected with any such case. This questionnaire will be circulated to the dentist, the anæsthetist, and any other professional man who may be thought able to throw light on the occurrence. It is hoped by this means to collect a mass of details as to the anæsthetics usually employed, and their comparative safety for dental operations; also as to the condition of health of the patient, and particulars of any special preparatory treatment that he may have undergone. The replies will be collated, and, after classification, published in whatever form appears best. It should be explained at once that the replies received will be treated as confidential, and nothing of them will be published beyond the points of medical and physiological interest. It is not intended to publish any names, either of the patients nor of the professional men concerned in the case. The help of our readers and of the medical and dental professions generally is earnestly asked for in this endeavour to improve their, and our, knowledge of the subject."

Questionnaire.

1. (a) Patient's age. (b) Sex.
(c) Married or single.
2. Personal and family history.
3. General health before operation.
4. Was anæsthetist patient's regular doctor?
5. Nature of operation.
6. Date and time of operation.
7. Where was operation performed?
Dentist's consulting-room. Patient's home. Nursing home. Hospital.
8. Was operation one of urgency?
9. Anæsthetic. (a) Nature of.
(b) Reasons for choice.
(c) Preliminary treatment, meals, atropine, etc.
(d) How administered? Closed methods. Open method. Intratracheal, etc.
10. (a) Was preliminary examination of patient made?
(b) If so, was anything abnormal found.
11. Duration of anæsthetic.—
(a) Induction period.
(b) Actual operation.
(c) Subsequent period.
12. (a) Onset of untoward symptoms and signs.
(b) Nature, course, and when first noted.
(c) Nature of treatment employed.
13. At what stage did death occur?
14. (a) Actual cause of death.
(b) Contributory causes.
15. Post-mortem findings.
16. Any further remarks bearing on case.

SPECIAL ARTICLES.

THE PENTAVALENT ANTIMONY COMPOUNDS IN TROPICAL MEDICINE.

By PROFESSOR DR. HANS SCHMIDT,
Elberfeld.

THE pentavalent antimony compounds* were first used in the treatment of infantile kala-azar in Mediterranean countries and subsequently in other tropical diseases; their true importance was, however, only recognised when they were applied to the treatment of Indian kala-azar. Careful and systematic therapeutic research in India first demonstrated that the form in which antimony is present in the p.a.c. is not only much less toxic but also has a much more powerful action on kala-azar than that present in tartar emetic.

In view of the interest in the p.a.c. prevailing in India it is not inappropriate to consider the history of these compounds from their cradle from a chemical and chemo-therapeutic aspect.

It is well known that the use of antimony in tropical medicine originated in the discovery by Plimmer and Thomson of the trypanocidal action of tartar emetic in mice.

The re-awakening of antimony treatment followed closely on the new arsenic treatment (Ehrlich): it was found that the trivalent compounds (salvarsan) and the pentavalent compounds (atoxyl, Spirocid, etc.) were extraordinarily useful in the ætiological treatment of infective diseases. This had not been possible with the inorganic salts or other simple compounds of trivalent or pentavalent arsenic.

Antimony is different in that its tartaric acid salt (tartar emetic) displayed a powerful specific action in a number of infective tropical diseases.

As in the animal experiments the margin between the toxic and the curative dose is narrow, so it was soon found that the prolonged injections necessary in combating sleeping sickness produced all the subsidiary effects and risks which are now well known to range from cough, vomiting and rheumatic pains to sudden death. In kala-azar, bilharziasis, venereal granuloma and other infective tropical diseases in which antimony was in rapid succession found to be an indispensable specific remedy, the secondary effects soon gave rise to grave anxiety.

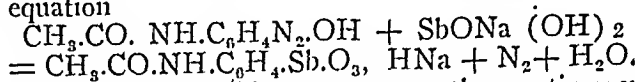
Antimony compounds had to be found which were suitable for use by modern injection methods, and which were at the same time effective and less toxic than tartar emetic, the official antimony preparation which had been used therapeutically since the middle Ages.†

* Abbreviated subsequently to p.a.c.

† In the 16th and 17th centuries antimony preparations including tartar emetic were very commonly administered internally and externally in other conditions (syphilis, pulmonary diseases, etc.). On account of the risks associated with its use there was much discussion at the time as to whether antimony treatment was permissible.

The model of arsenic suggested that better preparations might be obtained by combining antimony with organic molecules.

The preparation of *organic antimony compounds*‡ was first made possible in 1911 by the method of diazo-synthesis which I discovered in the scientific laboratory of Messrs. Von Heyden's Chemical Works: by the action of antimony oxide on diazo compounds an organic stibinic acid is formed and nitrogen liberated, e.g., sodium p. acetylaminophenyl-stibinic acid following the equation



It was thus possible to prepare the antimony analogue corresponding to arsacetin (stibacetin, stibenyl) as well as the antimony analogue of salvarsan: dioxydiamidostibiobenzol. In the latter, a trivalent organic antimony compound, the link between the antimony and the carbon is too labile.

The former, on the other hand, the pentavalent organic antimony compounds, the aromatic stibinic acids or their salts, were found to be stable compounds with interesting properties. The antimony reactions are obscured; thus they do not give the characteristic antimony reaction, red precipitation of antimony sulphide. The complex colloidal properties of antimonious acid, its power of forming higher molecular complexes, are modified in diverse ways by substitution in the benzol nucleus. When the difficulties of preparation and purification of stable salts had been surmounted, the compounds could be used for animal experiments.

Uhlenhuth and his fellow-workers tested the preparations in experimental infections with those diseases to which antimony treatment was at that time applied: trypanosome and spirillum diseases. Sodium p. aminophenyl-stibinate was one of the first preparations and was tried in 1912 in the spirillosis of fowls; chemically it proved, however, too variable and was correspondingly uncertain in its action. The sodium salts of p. acetylaminophenyl-stibinic acid and other derivatives of p. aminophenyl-stibinic acid were, however, found to have a beneficial effect on fowl spirillosis, rabbit syphilis and mouse trypanosomiasis and to be at the same time less toxic than tartar emetic. They had thus in animal experiments a more favourable chemo-therapeutic index than tartar emetic. Well over 150 antimony compounds were prepared after this auspicious beginning and systematically tested by Uhlenhuth, Kuhn, etc., in animal experiments.

The details are mainly described in papers by Uhlenhuth and by Kuhn and in a summarised publication by Uhlenhuth, Kuhn and Schmidt. It appeared that by substitutions in the benzol nucleus, the chemical properties, the toxicity and the therapeutic properties could be varied within

‡ Tartar emetic is only a loose combination of trivalent antimony oxide with tartaric acid, not a true organic antimony compound.

wide limits. Thus compounds are reached which are highly toxic but have no trypanocidal action, as for example sodium p. chlorphenylstibinate, and on the other hand compounds in which the toxic and trypanocidal or curative doses lie far apart. The latter include a number of other derivatives of p. aminophenyl-stibinic acid.

After some trials in syphilis which were not very effective, the organic pentavalent antimony compounds were first used therapeutically in infantile kala-azar in Italy. Shortly after the discovery by Cristina and Caronia of the tartar emetic treatment of this disease which had hitherto been incurable, Caronia (1915-16) used a number of pentavalent antimony compounds which had been tested on animals by Uhlenhuth. Caronia was searching for a less toxic antimony compound and particularly one which could be given intramuscularly to children even in infancy which was impossible with tartar emetic because of necrosis. Caronia chose sodium p. acetylaminophenyl-stibinate (stibacetin, later called stibenyl); he found that dissolved in water it could be injected intramuscularly without producing necrosis like tartar emetic, subcutaneously the preparation was absorbed too slowly. It was given intravenously in physiological saline to cachectic children. Secondary toxic effects were slighter than after tartar emetic, the therapeutic action slower, but the end result the same.

It is a consequence of political conditions that the echo of these observations has been delayed for a number of years. In Italy (Spagnolio, Foti and Javarone), in Spain (del Diestro and Barrio, Garza, Pittaluga, Catala, Torrademe, Lozano, Sadi de Buen, Puente, Moragas y Garcia, Ortega, Martinez) and in France (Klippel, et Monier-Vinard, Renault, Monier-Vinard et Gendron, Levy, Giraud et Massot.) stibenyl has been used and reported on in whole series of papers. The sporadic occurrence of kala-azar in these countries renders a comparison of uniform observations on large numbers of patients difficult. In essentials, however, extensive tests in Spain confirm Caronia's views.

The general secondary effects of tartar emetic injections are considerably milder with stibenyl. Intramuscular injections are in general well-borne, in a few cases slight abscesses were reported. A case of anaphylactic symptoms which occurred in Spain led to the suggestion that care should be exercised in giving the first dose after an interval in treatment. In addition to reports of rapid and complete cure there are also some of resistant cases in which combined treatment with tartar emetic is recommended.

In India, where in 1915 Rogers and Muir had introduced the treatment of kala-azar with tartar emetic, also attention was soon directed to stibenyl. While Manson-Bahr reported the cure in Europe of a lascar suffering from kala-azar, Napier and others only obtained quite inadequate results in India and with the first batch severe

toxic symptoms. How far the latter may have been due to defective stibenyl from other sources we will not discuss here. With reference to therapeutic effect the supposition that Indian kala-azar as such or under Indian climatic conditions reacts more severely to stibenyl than in European kala-azar districts cannot be lightly dismissed.

In spite of the failures with stibenyl the possibilities of the p.a.c. were recognised in India. Napier tested a further series of antimony compounds which had resulted from Uhlenhuth, Kuhn and Schmidt's work and reported his experience of sodium m. chlor-p-acetylaminophenyl-stibinate (471, Stibosan), in 11 patients with kala-azar.

This preparation was well borne by the patients, and Napier particularly emphasises the absence of pulmonary complications which were not infrequent after tartar emetic; the most striking difference from tartar emetic which Napier observed was however that the curative process was accelerated. The various symptoms—pyrexia, enlargement of the spleen—subsided more rapidly and the final cure was achieved in about three weeks with 10 to 12 injections as compared with 30 injections in 2 months necessary in the tartar emetic treatment.

With these observations a definite advance had been made. Following on Napier's results "471" was introduced into the stock of drugs under the name stibosan. Napier's experience soon received clinical confirmation in India (Greig and Kundu, Das, Hodgson, Rogers).

Napier himself reported further results in the following years, last in 1927 on a series of 104 patients treated. Extensive tests have been carried out to ascertain the number of injections necessary to avoid a relapse.

In the meantime, Brahmachari following Heyden's patent specifications had prepared and tested in the treatment of kala-azar p. aminophenyl-stibinic acid and several derivatives. He found sodium p. aminophenyl-stibinate, which he called stibamine, effective but the low stability of this compound described by Uhlenhuth and myself made its use impracticable. Brahmachari, however, succeeded in preparing a more stable product from the interaction of urea and p. aminophenyl-stibinic acid.* *Urea-stibamine*, which was extensively used in kala-azar as a rapidly acting remedy of low toxicity (Brahmachari, etc.).

Napier has also reported on two other derivatives of p. aminophenyl-stibinic acid; aminostiburea and stibamine glucoside. It appears from the

* Brahmachari at first assumed that this was a urea salt but later considered it to be an ammonium salt of p. carbamide-phenyl-stibinic acid. This has however been disputed.

summarised reports that these four p.a.c. reach the same level with regard to therapeutic qualities, so that the summary* of the advantages of the p.a.c. given by Napier in 1925 probably applies to all four:—

“The total amount of antimony which is necessary to effect a cure can thus be administered in a much smaller number of doses. About 12 doses of pentavalent compounds—against the 30 doses of sodium antimony tartrate—can be looked upon as the average number necessary for a non-resistant case.

“Resistant cases, which show little improvement with the tartrates, rapidly improve when given relatively large doses of antimony in the form of non-toxic pentavalent compounds.

“Certain disagreeable symptoms, such as coughing and severe joint pains, which are frequently associated with sodium antimony tartrate treatment, do not occur when the pentavalent compounds are injected.”

In the other kala-azar districts the results were similar to those obtained in India. Struthers reported the results obtained in China with stibosan and stibamine glucoside and likewise recognised the advantages of the pentavalent antimony compounds with their comparatively rapid action and low toxicity. Struthers administered smaller individual doses (0.2 gm.: 3 grains) of stibosan to Chinese patients than Napier to Indian patients (0.3 gm. $4\frac{1}{2}$ grains) and the treatment consequently took somewhat longer.

The superiority of p.a.c. has been confirmed from the *Russian kala-azar districts*: Artamonoff used stibosan and stibenyl, Smorodintsev and Korchitz obtained very rapid cures with stibenyl.

In the *Mediterranean districts* (see above) stibosan has been used as well as stibenyl, but the same high percentage and rapidity of cures as in India does not appear to have been observed in these districts in recent years.

General experience in India with the p.a.c. subsequently showed that further progress seemed possible and was desirable. The main

**Ind. Med. Gaz.*, November, 1925. Only after the present article had been concluded, the book by Napier on Kala-azar, Calcutta, 1927 was brought to the notice of the author. In this book Napier discusses in a detailed manner the advantages of p.a.c. and mentions among others:—

“The death-rate amongst kala-azar patients under treatment has been very markedly reduced since the introduction of the pentavalent compounds. One of the most frequent causes of death during the course of treatment, namely, pneumonia, has been almost entirely eliminated.”

As to the finer differences of the p.a.c. amongst each other in regard to their keeping qualities, the sterilizing dose, the mean number of injections prior to the cessation of fever, anaphylaxis, etc., special attention may be drawn to the statement made in the book by Napier.

reasons from the detailed reports of the Indian publications may be summarised as follows:—

First the number of recoveries which without treatment was 5 to 10 per cent. rose with tartar emetic treatment to about 80 per cent. and with the p.a.c. further increased to 90 per cent., so that a certain proportion of patients always died during treatment.

Anaphylactic-like symptoms were observed after the p.a.c. ranging from a tingling sensation and mild urticarial rash to severe symptoms (Napier, Struthers†), when stibosan is used; these symptoms are exceedingly rare. In some of the p.a.c., vomiting is not a rare secondary effect.

Chopra compared the pharmacological effect on cats of the p.a.c. with tartar emetic mainly with a view to elucidating the acute symptoms resembling “nitritoid crises” and is of the opinion that:

“The circulatory changes in the pulmonary, systemic and venous systems and the changes in the circulation of the spleen, liver, etc., account for all the milder toxic symptoms such as faintness, feeling of fullness in the region of spleen and liver, etc. The severe toxic symptoms such as dyspnoea, cyanosis, marked respiratory disturbances resembling nitritoid crisis are associated with extreme changes in the pulmonary pressure as well as contraction of the bronchi.” We shall return to Chopra’s observations later.

Napier found that “post-treatment jaundice, a common sequel to treatment by many of the pentavalent compounds” occurred much more frequently than the anaphylactic-like symptoms, which points to damage of the liver from the treatment.

All these circumstances induced Napier to continue the search for a more perfect p.a.c.; he found such a one in preparation 693 (diethylamine p. aminophenyl-stibinate of Uhlenhuth, Kuhn and Schmidt) and reported in 1927 the excellent results obtained in 61 patients with kala-azar.

In order to consider this advance in greater detail we propose to discuss some important aspects of the work which has in the meantime also been extended by various other investigators. The most obvious clinical difference between the p.a.c. and tartar emetic is the more rapid cure obtained. Is the difference a qualitative one or does it merely follow from the fact that it is possible with the less toxic pentavalent compounds to use larger single doses and so administer the total therapeutic dose more rapidly?

†Napier as well as Struthers recommends that when these appear treatment should be continued with another antimony preparation. Napier considers it advisable to continue with very small doses.

The Indian publications give the following as the average doses in kala-azar:

	Full Single Dose.	= Sb.	Total Course.	= Sb.	Total number of injections.
Antimony Tartrate (37 % Sb ⁱⁱⁱ) ..	0.1 gm.	0.037 gm.	3 gms.	1.1 gms	30 or more
Stibosan (31 % Sb ^v) ..	0.3 gm.	0.093 gm.	3-3.5 gms.	0.93-1.08 gms.	10-12
693 (40 % Sb ^v) ..	0.3 gm.	0.12 gm.	2.1-2.7 gms.	0.84-1.08 gms.	8-10

These figures seem to support the latter interpretation.

It is important to remember however that according to Brahmachari 30 to 40 per cent. of urea-stibamine (Sb^v) is excreted during the first twenty-four hours after intravenous injection and only 6 per cent. of antimony tartrate (Sbⁱⁱⁱ) during the same period.*

It may be assumed that this also holds good for other p.a.c. whereby the quantities of antimony circulating in the blood after injections at 2 to 3 days interval would be considerably modified.

Some very interesting observations have been made in India which are reviewed below:—

The first of these observations is taken from Chopra's work in which the effects on the circulation, different organs, etc., are compared.

Chopra observed in experiments on cats "a well marked increase in the spleen and liver from the pentavalent antimony compounds, "rhythmic movements of the spleen are increased"†. Chopra considers it likely that "the influx of a large amount of blood charged with antimony into these organs probably helps in the destruction of the organisms lying therein. The tartrates produce these changes to a lesser degree and possibly this accounts for their lower curative effect"‡.

A further interesting difference is the precipitation of serum by the p.a.c. recently discovered by Chopra. When a solution of the p.a.c. is dropped into the serum of a kala-azar patient flocculation occurs; this has already been used as a serological test in the diagnosis of kala-azar. Tartar emetic does not give this reaction. Napier points out that this flocculation varies in degree, the most effective of the p.a.c. (693) producing the densest flocculation. Fabris was able to carry out the serum test favourably with Stibosan in infantile kala-azar.

* Mallardi in his clinical experiences in regard to the elimination of tartar emetic in infantile kala-azar found that in patients in good general condition the drug is eliminated in 2 to 3 days. In those in bad general condition after repeated doses it might take 5 to 8 days to obtain complete excretion. This indicates longer intervals in its administration in the later stages in debilitated patients.

The conditions of elimination of the pentavalent antimony compounds have still to be further investigated.

† The antimony injections can thus in some cases according to Chopra have a provocative action: "The engorgement and increased rhythmic movements produce rupture of the endothelial cells and liberation of the Leishman-Donovan bodies in the general circulation. The organisms, therefore, appear in the blood of these patients, where they could not be detected before." *Ind. Journ. Med. Res.*, Vol. 15, No. 3.

‡ *Ind. Journ. Med. Res.*, Vol. 15, No. 1. Hodgson mentions that an increase in the size of the liver frequently occurs as a result of the use of p.a. compounds.

Chopra further found on trying the new "antimony test" during the treatment with urea-

stibamine that after about the twelfth injection the test is uncertain, which roughly corresponds to the number of injections which practical experience has shown are required to ensure a cure without relapses.

In the two examples quoted there is a distinct difference between the p.a.c. and trivalent tartar emetic while the p.a.c. only show a slight difference among themselves. Both support the view that in addition to the larger doses fundamental qualitative differences play a part in producing the better therapeutic effects of the p.a.c.

With regard to the parasiticide action trivalent antimony has *in vitro* a stronger effect in killing organisms and in inhibiting their development than pentavalent antimony (Friedberg and Joachimoglu determined this with inorganic antimony preparations).

Attempts at curing *experimental mouse trypanosomiasis* also demonstrated the fundamental differences between the p.a.c. and the trivalent antimony compounds (Uhlenhuth, Kuhn and Schmidt).

Tartar emetic very rapidly damages trypanosomes circulating in the blood stream of the mouse; after 2 to 3 hours they have disappeared from the blood picture; the other trivalent antimony compounds have the same action as antimosan. *The effective p.a.c. on the other hand such as stibosan only produce this effect in 1 to 2 days.* Thus the p.a.c. show a latent period between the injection and the trypanocidal action analogous to that of the arsenic compounds investigated by Voegtlin and Smith. Whether this latent period is due to a chemical reduction to a trivalent compound § which has a direct action as probably occurs in the aromatic arsenic compounds further investigations must show.

The p.a.c. are found to act more slowly in mouse trypanosomiasis than tartar emetic, i.e., the reverse of their action in kala-azar in which the trivalent tartar emetic is the slower. If, however, the ultimate curative effect rather than the action on the trypanosomes circulating in the blood of the mouse be considered the p.a.c. are found to be superior to tartar emetic in the mouse experiments also.

Tartar emetic in the almost lethal dose of 0.4 mg. = 0.14 mg. Sbⁱⁱⁱ will temporarily free mice infected with dourine or *T. brucei* from trypanosomes but relapses occur. A single injection of 2 mg. stibosan = 0.62 mg. Sb^v is frequently sufficient to cure the mice without

§ This reduction proceeds much more readily, as I found by measurement, in the organic arsenic acids and the organic stibinic acids than in the pentavalent inorganic compounds.

relapses; a number of other p.a.c. have a similar action.

This is, however, not a fundamental difference, for with antimosan, as already mentioned, a tri-valent antimony compound with reduced toxicity, it is also possible to cure such mice without the occurrence of relapses by means of a single injection of 2 mg. = 0.25 Sbⁱⁱⁱ.

Antimosan is a complex salt of antimony oxide and a non-toxic derivative of pyro-catechin. It contains trivalent antimony but in contrast to tartar emetic the antimony is very firmly bound in a complex molecule so that it is not precipitated from an aqueous solution either by acids or alkalis. When the above excellent results had been obtained by Uhlenhuth, Kuhn and Schmidt in experimental cures it seemed justifiable to assume that it would be possible to obtain a particularly effective kala-azar remedy from the trivalent antimony compounds. It was indeed found that antimosan which is given in single doses of 0.4 gm. = 0.05 gm. Sbⁱⁱⁱ has the advantage over tartar emetic that it is better tolerated locally in intramuscular administration and generally, while it has the advantage of acting more rapidly in kala-azar only to a small extent and is in this respect much less effective than the p.a.c.* (Napier, Muhlens, Struthers). Though experimental trypanosomiasis cures have been very valuable for selecting suitable antimony compounds from the numerous ineffective ones, Uhlenhuth, Kuhn and Schmidt have drawn attention to this divergence between trypanocidal† and kala-azar action which like other observations points to the possibility of a specific therapeutic action.

As a result of these indications it was necessary to take into consideration in the search for a more perfect p.a.c. for treating kala-azar, not only the therapeutic effect in mouse dourine, but also the experience obtained with kala-azar. His experience led Napier to take particular interest in p. aminophenyl-stibinic acid.

The p.a.c. which have so far been prepared can all be regarded as derivatives of p. aminophenyl-stibinic acid. We can divide them into three groups:—

1. Salts of p. aminophenyl-stibinic acid:

Sodium p. aminophenyl-stibinate (stibamine).

2. Derivatives obtained by substitutions in the amino group of p. aminophenyl-stibinic acid:

Stibenyl (Sodium acetyl p-aminophenyl-stibinate), Urea-stibamine, stibamine glucoside, aminostiburea. (The three latter preparations, as far as can be gathered from the literature, also belong to this group.)

* The superiority of the p.a.c. as compared with antimosan has so far only been proved in kala-azar. In other diseases such as bilharziasis it has not yet been decided whether a trivalent or a pentavalent antimony compound is the better.

† R. Schnitzler was indeed able to demonstrate the superiority of stibosan in experimental nagana when tartar emetic-resistant parasites were used; when mice were inoculated with this they could be cured with stibosan, while antimosan and also stibenyl remained without effect.

3. Derivatives obtained by substitutions in the benzol nucleus of p. aminophenyl-stibinic acid or p. acetylaminophenyl-stibinic acid:

Stibosan (sodium m-chlor-p-acetylaminophenyl-stibinate).

The reasons why the preparations in group 1 have not hitherto been used therapeutically is because the only known salt of p. aminophenyl-stibinic acid, the sodium salt, will not keep. Since a number of derivatives of this stibinic acid are useful in the treatment of kala-azar it was interesting to test the basal substance p. aminophenyl-stibinic acid afresh when the stable diethylamine salt had been prepared (639).‡ Napier's results in kala-azar with preparation 693 are as follows:—

Of 61 patients 58 were cured, of the remaining 3 one only received incomplete treatment and two others were absolutely resistant to antimony. *There was no death in the whole series!* Napier recommends 2.7 gms. to be given in 10 injections. He particularly emphasises that "post-treatment jaundice, such a common sequel to treatment by many of the other p.a.c." was not observed, an extremely useful indication of the non-toxic nature of the new remedy. Anaphylactic symptoms have also never been observed.

Napier's results showed that with the diethylamine salt it was possible to introduce p. aminophenyl-stibinic acid into the treatment of kala-azar in a practical form obviously superior to the derivatives hitherto available.

Before the wholesale preparation of the compound could be considered it was however desirable to eliminate the secondary effects of nausea which had been observed with therapeutic doses and to obtain a more stable aqueous solution.

I was able to carry out these investigations in the laboratory of the I. G. Farbenindustrie at Elberfeld to which the preparation of the antimony compounds had in the meantime been transferred from the Heyden chemical works. In collaboration with Rohl of the chemotherapeutic institute, and Eichholtz, of the pharmacological institute of these works, remarkable results were obtained.

The following preliminary remarks may serve as a general explanation. Two causes have so far been found for the differences in biological action of the various organic antimony compounds (the parasitotropic as well as the organotropic action of Ehrlich) and these were, first the degree of oxidation of the antimony residue (tri- and penta-valent), next the substitutions in the benzol nucleus. The latter have a very marked effect. The following extremes for example are taken from Uhlenhuth, Kuhn and Schmidt's tables:

Sodium p. acetylaminophenyl-stibinate (has trypanocidal action).	Lethal dose for mouse: 12 mgm.
Sodium p. chlorphenyl-stibinate (has no trypanocidal action).	Lethal dose for mouse: 1 mgm.

‡ For therapeutic effect in mouse dourine cf. Uhlenhuth, Kuhn and Schmidt.

With the organic stibinic acids another factor also plays a part: *The special significance of the complex chemical and colloid-chemical state of the antimony acid radicle for the whole molecule.*

During my studies of these substances I devoted particular attention to the variability of the stibinic acids and have published in detail the methods used for investigating them and the results obtained. The benzol substitutions in the aromatic stibinic acids have the special effect of determining the condition of the antimony acid radicle in the above sense*. In this connection the formation of salts and the preliminary treatment from the colloid-chemical point of view is also of importance†.

Thus it appeared that in the diethylamine salt of p. aminophenyl-stibinic acid these points might be of particular importance.

By varying the method of preparation step by step and with simultaneous constant control by innumerable animal experiments it was possible to obtain a modification of the diethylamine salt of p-aminophenyl-stibinic acid with definite chemical properties, very stable, of complex chemical structure and characterised by marked diminution of toxic properties.

Thus according to the findings in the chemo-therapeutic and pharmacological laboratories here the doses tolerated by mice weighing 20 gm. were as follows:—

Tart. Antimon. (36.6% Sb)	0.4 mg. =	0.15 mg. Sb. ⁱⁱⁱ
Antimosan (12.5% Sb.)	.. 6 mg. =	0.75 mg. Sb. ⁱⁱⁱ
Stibosan (31% Sb.)	.. 15 mg. =	4.65 mg. Sb. ^v
693 (40% Sb.)	.. 7 mg. =	2.8 mg. Sb. ^v
693b = Neostibosan (42% Sb.)	40 mg. =	16.8 mg. Sb. ^v

Dr. Napier has also used the new modification 693b in the treatment of kala-azar: with his kind permission we are able to state that he has obtained similar excellent results with 693b in spite of its much lower toxicity to those obtained with the preparations of 693 previously tested. As was to be expected, the reduction in the toxicity has resulted in the elimination of nausea after therapeutic doses. We look forward with great interest to further information from Napier on the results of treatment obtained.

A 25 per cent. solution of this compound in distilled water is blood-isotonic, is easily prepared in this dilution and according to Napier, when given intramuscularly causes practically no pain or local reaction.

* Differences in precipitation and flocculation by chemicals follow from this, which bear a striking resemblance to the differences shown by the various p.a.c. in the "serum test."

† In this connection it may be mentioned that Brahmachari (*Ind. Journ. Med. Res.*, Vol. 13, No. 1) and Niyogy (*Quarterly Journ. Ind. Chem. Soc.*, Vol. 4) have recently described the preparation of sodium-chlor-p. acetyl-amino-phenyl-stibinate, which is supposed to be identical with stibosan (471). It does not, however, correspond in either case since these authors precipitate their preparation from an aqueous solution with alcohol while a solution of stibosan, however concentrated, remains clear on the addition of alcohol.

The preparation of p.a.c. in stable form and of constant composition requires special experience and apparatus.

The preparation 693b is being introduced into the treatment of kala-azar under the name of "Neostibosan."

The history of the therapeutic use of the p.a.c. is mainly the history of the progress made in the treatment of kala-azar in India during the last seven years.

In the other tropical diseases which are treated with tartar emetic the p.a.c. have as yet not been so extensively tested but a large number of results have already been reported.

According to a number of authors a course of injections of stibenyl or stibosan will cure *oriental sore* (Plessier, Torrademe, Snijders, Talaat, etc.), even in cases in which tartar emetic has failed (Oven). Some authors recommend instead of or in addition to intravenous and intramuscular administration, the application of an ointment to the ulcer‡ (10 per cent. Stibosan ointment, Lindenberg) or injection into the ulcers (Plessier, etc.).

In Brazilian leishmaniasis of the mucous membrane (espundia) the curative effect of the p.a.c. did not according to Lindenberg reach that of the trivalent compounds (tartar emetic and antimosan). Wilson and Shrewsbury cured a severe chronic case (11 years!) of espundia with 17 injections of stibosan = 4.6 gm. after a few preliminary injections of tartar emetic.

Trypanosomiasis.

V. d. Branden found in the Belgian Congo that stibosan was not superior to the trivalent compounds in chronic cases.

Manson-Bahr cured one case of sleeping sickness with stibenyl which had not improved with tartar emetic.

Kleine found that stibosan was more effective than the trivalent compounds, especially when combined with Bayer "205" (Germanin).

Veneral Granuloma.

In his campaign against this disease carried out on a large scale in New Guinea, Thierfelder has used in addition to tartar emetic, antimosan and Bayer 211, stibenyl and stibosan. Of the two pentavalent compounds stibenyl followed tartar emetic in therapeutic effect, while stibosan acted more rapidly and more strongly than stibenyl and apparently was also more effective than tartar emetic. Both preparations were better tolerated than tartar emetic, the marked tonic action of both the p.a.c. was striking. The patients became so to speak "fat and round," while tartar emetic especially with repeated courses of treatment produced a diminution in body strength.

Manson-Bahr and Anderson found the p.a.c. superior to tartar emetic in effect and better tolerated.

‡ Tartar emetic is also applied by some direct to the ulceration, but this is a painful method of treatment and can only be carried out after the ulcers have been anaesthetised. For this purpose the non-irritating p.a.c., e.g., 10 per cent. stibosan ointment, are much more suitable.

Bilharziasis.

Manson-Bahr was unable to produce any effect in one case with stibenyl. Ziemann and Schirokauer on the other hand report excellent results in a number of Egyptian students treated in Germany. From Egypt itself the mother country of bilharziasis, where the trivalent antimony compounds are extensively used in combating the disease and the toxicity of tartar emetic gives rise to grave anxiety, no decisive conclusions have been reached on the p.a.c.

In *leprosy* Froilano de Melo found stibenyl effective as an adjuvant to chaulmoogra treatment and in one case Archibald obtained a similar result with stibenyl alone in *tubercular leprosy*.

Leber (Java) cured 2 cases of *tropical pemphigus contagiosus* with stibenyl injections.

Reviewing the latter results the reports at present available indicate the superiority of the p.a.c. only in oriental sore and venereal granuloma but this has not been as definitely proved as with kala-azar.

From the experimental and clinical observations it is not impossible that in some tropical diseases we shall not be able to dispense with the trivalent antimony compounds with their more powerful immediate effect, though it will be possible to avoid many of the drawbacks of tartar emetic which, as already mentioned, is an unsuitable preparation for use by injection; trivalent compounds such as antimosan are available which are suitable for injection and more readily tolerated.

The results with kala-azar demonstrate very clearly, however, that antimony treatment with the p.a.c. has become indispensable since it can be made more rapid, safer and more certain by the use of larger doses and probably by a different mode of action, so that it seems desirable to use the p.a.c. wherever they achieve the same or better results than the trivalent antimony compounds. Further tests are in progress in various places through the courtesy of tropical research workers and these include tests of neostibosan, the improvement recently found in India for the treatment of kala-azar.

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THE SCIENTIFIC AND ECONOMIC IM- PORTANCE OF RESEARCH ON INDIAN MEDICINAL PLANTS.

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IN a recent very interesting paper on Indian Indigenous Drugs (The Held for Research in Indian Indigenous Drugs—by R. N. Chopra, M.A., M.D., Lieut.-Col., I.M.S., *The Patna Journal of Medicine*, Vol. III, No. 3, July, 1928), Col. Chopra has discussed the chemical, pharma- cological and clinical aspects of the subject and has also pointed out a few of the economic and scientific aspects of the question. In this paper I will try to discuss these latter aspects in more detail in order to bring out other points likely to be of interest to the physicians of the indi- genous systems and also to other people interest- ed in the subject.

Statistics.

Starting with the economic side of the ques- tion, let us consult only the statistics for a short period of 5 years, say, from 1919 to 1924.

The total value of Drugs and Medicines (excluding chemicals and narcotics).

	1919-20	1920-21	1921-22	1922-23	1923-24	Average per year
Exported from India ..	Rs. 45,46,980	48,32,390	35,13,048	22,89,352	28,97,624	Rs. 36,15,878
Exported from Bengal ..	Rs. 11,79,360	13,60,130	8,05,995	5,39,660	11,52,914	Rs. 10,07,603
Imported to India ..	Rs. 1,82,49,640	2,11,28,270	1,58,37,225	1,66,08,511	1,81,32,945	Rs. 1,79,91,326
Imported to Bengal ..	Rs. 58,53,690	77,35,950	55,21,575	54,61,091	60,00,246	Rs. 61,14,510

India's Potential Resources.

A perusal of this table will show the large amount of drugs and medicines (excluding chemicals and narcotics) exported from India and a very much larger amount (about six times) imported for our use. There can be little doubt that India has great potential resources. It only requires the attention of the people to develop these on economic lines, and it is not too much to hope that India may supply the whole world with drugs growing in tropical and sub-tropical climates.

Drugs of European and American Pharmacopœias growing in India.

The chemist and the pharmacologist can help in different ways. Many of the drugs used in Europe and America, for which some sort of standard has been laid down, grow in various parts of India. A systematic research or chemical and biological assay of all these drugs can be gradually taken up by the chemist and the pharmacologist and their value relative to those growing in other parts of the world can be ascertained. It will be necessary not only to assay those growing wild in different parts of India, but also to find out the seasonal variation of the more important ones and the soils in which they grow best.

Increased Export and Cultivation: Some Examples.

The work will naturally lead to an increased export and also to more scientific cultivation in order to increase the value of the drugs. Russian *Artemisia* growing wild had a santonin content of less than 1 per cent., but its cultivation increased the content to nearly 3.6 per cent., and Russia gradually became the best source of santonin. *Artemisia* grows wild in some parts of the Himalayas, in Baluchistan and in the Hindu-Kush mountains. India can supply the whole world with santonin if only a little attention is given to its cultivation. *Digitalis* leaves or preparations used to be imported in large amounts from outside India. Recent researches in India showed that the imported drug deteriorated to a great extent owing to transit, storage or climatic conditions and that it was necessary to get fresh leaves from Indian sources to secure an active preparation. *Digitalis* leaves of excellent quality are now being grown in different

parts of India, and the Indian drug is gradually coming into wider use. Again, *Ephedra vulgaris* grows wild in many parts of Northern India, and recent researches on Indian ephedra have created a great demand for it outside India. America alone ordered 34 tons (918 maunds) of ephedra during 1928. The alkaloid (taking the minimum yield of 0.5 per cent. of ephedrine) from 34 tons would fetch a value (at current price) of nearly four lakhs of rupees. And if further researches lead to its wider use in medicine, India will be a rich source of the drug. Numerous instances like the above can be found which would lead not only to increased export but also to increased cultivation.

Industrial Enterprise.

Again, the utilisation of some of these drugs in local factories would prove more economical than the export of the crude material. Thus the manufacture of caffeine from tea-dust, or of strychnine from *Nux vomica* seeds are examples of substance whose manufacture in India have proved quite economical in spite of the high cost of solvents bought from abroad. These factories would in turn lead to other industries for the manufacture of solvents or chemicals as soon as demands for these increase.

Drugs not recognised by B.P. or U.S.P.

There are again other drugs which are widely used by the physicians of the indigenous systems, but which have so far found no place in the European or American pharmacopœias. Systematic study and research will certainly help to create a demand for some of these drugs outside India and indirectly help their increased production and the evolution of industrial enterprises. The simple case of Indian Kurchi (*Holarrhena antidysenterica*) may be cited as an example. The recent researches on the subject in India have aroused great interest in the drug and already people in India and abroad are enquiring about the alkaloids, and drugs merchants are receiving orders for the crude drug outside India. The case of Kut root (*Saussurea lappa*) is another instance in point. Recent researches have shown that its alcoholic extract has a remarkable effect in controlling the paroxysms of bronchial asthma and is particularly effective in the vago-tonic type of asthma which is the

prevalent form in India. Manufacturers have now taken it up and it is bound to find a demand outside India.

Economy by the Use of Crude Drugs.

Coming again to the scientific aspect of the subject, let us discuss some of the questions raised. Physicians of the indigenous systems and also some of the general public have often been heard to remark that there is considerable economy in the use of crude drug powders, decoctions or fresh juices for a poor country like India and that it is unnecessary to isolate the active principles and study them on modern scientific lines. We have never disputed that this is an economical method, and we are even aware that examples are not rare in modern European and American medicines where the drug is used as a whole without attempting the isolation of the active ingredient. But there is this difference, that whereas Europe or America would not accept any drug unless tested by modern chemical, biological, pharmacological or clinical methods, we are asked to accept it on grounds of tradition or reference in an old text.

Modern Scientific Attitude.

We should never try to forget the attitude of the modern scientific mind, be it European, American or Asiatic. It has been aptly pointed out by Col. Chopra, that until these drugs are investigated on modern scientific lines, their use by the profession must necessarily be restricted, while other countries not bound by our local traditions will not use them at all, until the case is proved as to their utility. I would go a little further and say that even the physician of the indigenous system, with his modern scientific bent, should hesitate to use the drug, before he is satisfied that he can get the genuine substance of undoubted activity; for this there are several reasons:—

Variations of Active Principles.

Firstly, it has been proved in the case of many drugs that there may be enormous variations of their active principles with the change of season, the diversity of place, the nature of the soil, and even with the slightest variation of the species. I may simply cite the case of ephedra, a drug which we have ourselves studied. The active principle, ephedrine, has been found to vary a good deal with the seasons, and a variation in the species has resulted in the complete absence of the alkaloid. It is impossible for an ordinary drug supplier, the class of person on whom the physician has to depend (especially when practising in a town) to distinguish such variations of species, and it is even a very difficult problem for an expert botanist to do the same unless he is supplied with the various parts of the plant. A physician may thus be administering a drug without knowing whether it contains the active ingredient responsible for the cure. It is

only by the researches of the chemist and the pharmacologist aided by the botanist that such catastrophies may be avoided. There is not only the risk of the patient's losing all faith in the physician, but also of landing the system into disrepute. There is no harm in using the drug as a whole for economy, but one should know for certain that the active ingredient is present, even if not in the exact strength desirable for efficiently producing the very best effect.

Drugs that require Sifting.

Secondly, it is well known that there are various drugs having very little therapeutic value, which are used only because they are mentioned in old literature and because nobody has taken any trouble to confirm the truth or otherwise of these statements. A scientific basis is, therefore, essential and research is necessary to confirm their curative value or to reject them as useless. If the researches do point out the value of some of these drugs, they will then be accepted by the scientific world outside India.

Modern Conditions.

Thirdly, we should be wide awake to our modern conditions of life. The physicians of old, born and trained in a less artificial country life, had better opportunities of knowing the genuine herbs from their childhood. They knew the proper soil for their growth, the proper time for their collection, and several other factors to which the older works on the subject refer. The modern physicians, mostly trained in towns, never get these opportunities of knowing the plants first-hand and have to depend on unreliable and illiterate drug collectors, and they are even unable to satisfy themselves as regards their exact identity, not to speak of the proper season, soil or culture.

Are Fresh Drugs better than Active Principles?

It has been remarked by physicians of the indigenous systems that fresh juices or drug powders or other decoctions are better than the so-called active principles isolated by chemists, and also that modern methods of isolation destroy some of these active principles. A detailed discussion of the modern methods would lead me beyond the scope of this paper. I am quite aware of the drawbacks of the chemical methods, but as was only recently expressed by an eminent English professor of medical chemistry, one of the foremost research workers of the world, we are unable to accept the view that most of the active ingredients are destroyed by the modern chemical methods, assuming, of course, that due care and consideration have been bestowed during the investigation of a drug.

Combined Action of a Drug.

There is no doubt that there may be cases of drugs where the individual substances isolated do not explain the action produced by the drug as a whole and the result of a combined action must be assumed, but this can always be

safeguarded by simultaneous clinical trials of the whole drug. And after all, this consideration is by no means sufficient to deter a real well-wisher of the systems from supporting the pursuit of the scientific study of drugs.

Why are the Older Systems lagging behind?

It is not an easy problem to popularise a system for a large country like India. Drugs of the so-called allopathic system have steadily displaced the older systems prevalent in India, as I believe, not due to any political considerations, but because people have found them to be more speedy in their action and because they are based on scientific principles. Nobody can deny that there are hosts of really good drugs in the indigenous systems, but they have to be raised from empiricism to science. A systematic scientific study, a combined effort of the botanist, the chemist, the pharmacologist and the clinician is necessary to point out the really good points in these drugs; then, and then only, can we expect them to be accepted by scientifically minded people, be it in India or outside of it.

Scientific and Economic Value of Active Principles.

The isolation and detailed scientific study of the active principles from vegetable and animal sources draw our attention in two ways. First of all, these methods have made enormous contributions to our store of medical and scientific knowledge. Experiments on the pure compounds have revealed the exact pharmacological action of each of them and the study has led to scientific studies of a most varied nature on the chemical side. Secondly, they have contributed a good deal towards the development of various industries on synthetic and other lines.

Institutes in Europe for the Study of Medicinal and Economic Plants.

A study of the activities of Europe on the subject will be of interest to us here. In countries like Switzerland or Germany, one comes across either a pharmaceutical institute or department in almost every university. A large number of students are trained in chemistry, botany, pharmacognosy, pharmacy, toxicology, and many other allied subjects. Research is carried on in medicinal or economic plants, side by side with research on synthetic lines and the work leads to economic developments in various ways, not to speak of the scientific achievements of which they can rightly boast. The chemical departments of the various universities likewise contribute a good deal towards research on these lines.

Need for More Centres.

It would be difficult to find any medicinal plant growing in Europe which has not been investigated by scientists and it is a pity that this branch of research is neglected in India, a veritable emporium of medicinal plants. There is no dearth now of research chemists of the highest

order all over India and the only thing is to draw the attention of these workers to a subject of such economic and scientific importance. Some of the research students in each university might be entrusted with this work and important advances could be expected from such a combined effort.

Research Laboratory is Not Extravagant.

The initial cost of starting a research laboratory for chemical and pharmacological studies in a province, and even its recurring expenditure, may appear to be great, but the various benefits derived therefrom will amply justify its existence as an economic project. The example of business-minded people like the Germans or the English spending lavishly on research should certainly help to convince us about the economy in the long run.

Co-operation of Physicians of the Indigenous systems.

Lastly, the co-operation of the physicians of the indigenous systems (Ayurvedic or Tibbi) is essential in a work of this nature. They may, first of all, help us in the difficult problem of selection of good drugs which is often a source of great disappointment and discouragement to a new investigator. Again the work of the investigator is simplified a good deal if he knows the preliminary treatment of the drug, the exact mode of its administration, the kind of action to expect, and a few other points of a similar nature which the experience of the physician can alone teach him. The present method of finding these out from old literature entails a good deal of time and labour which could be considerably lightened by the physician practising in that system.

Appreciation of Scientific Spirit.

Finally, a proper appreciation of the scientific spirit, instead of the present distrust arising out of a groundless fear of our encroaching upon the domain of secret remedies, is essential for the above co-operation and the proper development of the systems on a surer, scientific basis.

We must remember in the words of Dean Stanley, that "Nothing is so narrowing, contracting and hardening as always to be moving in the same groove with no thought beyond what we immediately see and hear close around us."

Current Topics.

League of Nations. Health Organisation. Malaria Commission.

Meeting of the Malaria Commission at Geneva, June 25th-29th, 1928. Medical Press-Report.

FOLLOWING upon the publication of the Second General Report of the Malaria Commission and a Report on a visit to the United States of America undertaken by members of the Malaria Commission, certain criticisms

were made both in America and in the Far East regarding the conclusions reached in these two reports. It was decided therefore to invite a number of leading malariologists outside the Malaria Commission to submit in writing their criticisms upon the reports and further to attend the next meeting of the Malaria Commission. This meeting was held in June 1928 at Geneva and was attended by thirty-four malariologists, including members of the Commission. Amongst those attending for the first time, there were in addition to members of the United States Public Health Service and the International Division of the Rockefeller Foundation, representatives of the Colonial Office, London, the London School of Hygiene and Tropical Medicine, the Superior School of Malariology, Rome, the Royal Colonial Institute, Amsterdam, and the Department of Hygiene of the Hebrew University, Jerusalem. Engineering in its relation to malaria was represented by the Deputy Director of Public Works, Nigeria and the Chief Civil Engineer, Rome.

The Session lasted six days during which the conclusions of the Malaria Commission were discussed and proposals made regarding questions calling for international study. In the first instance, four general principles of anti-malaria work, as laid down in the Second General Report of the Malaria Commission, were considered by the full Commission. These principles, which were adopted after certain minor alterations in the wording, were as follows:—

1. In Europe, having regard to the present state of knowledge, correct anti-malarial practice is an endeavour to reduce the incidence and severity of the disease. Measures designed to accomplish more than that (particularly measures aiming at "eradication") are not a wise proposition and can be justified only under very exceptional circumstances.

2. It is not always necessary to deal with malaria by a method arising directly out of the knowledge that the disease is transmitted by mosquitoes.

3. In every country and very largely in every area, there must be preliminary examination to ascertain what method is best suited to the local conditions.

4. At present, it cannot be said that for malaria control there is a method for choice superior to all others.

The Commission set up three Sub-Commissions to facilitate the task of the Conference.

The First Sub-Commission dealt with the methods to be employed in anti-malarial work as indicated in the Second General report of the Malaria Commission.

The Second Sub-Commission considered certain epidemiological aspects of malaria and recommended to the plenary session a number of subjects for international studies and collaboration.

The Third Sub-Commission discussed the use of quinine in malaria.

After very full discussion, the following resolutions were submitted by the First Sub-Commission to the plenary Commission.

1. "Each Government should establish a central permanent organisation, either independent or attached to an institute, composed of several selected workers who would devote their whole time to malaria research and would act as scientific advisers."

2. "The Sub-Commission is not in favour of utilising all available methods of control in the same locality at the same time. It considered it preferable to employ only the method or methods which, with the means available, can be brought above the standard called minimum effective degree of perfection."

3. "Subject to certain defined limitations, determined by a knowledge of local conditions, there should be considerable freedom of choice as regards the particular methods of malaria control to be adopted. The Sub-Commission deprecates the use of measures in one region solely on the ground that they have been successful in another where, perhaps, circumstances and conditions are quite different."

4. "Whatever other means may be employed in malarial localities, the Sub-Commission considers that it is essential in the first place to treat the sick."

5. "The good results of early diagnosis and efficient treatment are more apparent in the reduction of the severity of the disease than in the reduction of its incidence."

6. "The execution of the measures must reach a sufficiently high degree of efficiency ('minimum effective degree of perfection') before its effect on incidence becomes appreciable."

7. "The improvement of the conditions of the inhabitants which results from the development of widespread 'bonification' is one of the determining factors in the regression of malaria. The work done is only efficacious in so far as it leads to intensive cultivation of the ground."

It is certain, however, that the use of anti-larval measures whilst more extensive works are being carried out, is of great value inasmuch as it reduces the anopheline density and serves to bridge the dangerous period which accompanies and follows such undertakings."

The treatment of the sick was accepted by all members as the invariable initial step in any anti-malaria campaign. No unanimity existed, however, as to how far this could be regarded as a preventive measure. There appears to be no doubt that the effect of the distribution of quinine is to lessen the severity of the disease, but no definite evidence of a resulting reduction in the number of cases was forthcoming.

Passing to the preventive aspect of anti-malaria work, the Commission laid stress on the fact that in every district malaria presented a local problem, the solution of which could only be found by a detailed study of the conditions obtaining in the locality. This investigation can only be satisfactorily undertaken by a highly trained group of research workers who devote their whole time to the investigation of malaria and whose services would be available in an advisory capacity for any locality in their district. As a corollary to this, the Commission deprecated the use of methods solely on the ground that these had been of value elsewhere and it consequently further urged the inadvisability of adopting all available methods of control until one or more of these methods had actually reached, in the locality in question, a standard of efficacy which the Commission termed "the minimum degree of efficacy."

The need for searching scientific investigation in every locality and the careful and deliberate selection of one or more methods based on the results of these researches is, in the opinion of the Commission, of universal application. In this connection, the fact is to be noted that a research staff should deal with malaria only and not with this disease simply as one of a number of public health problems. The Commission, moreover, emphasised the fact that in order to avoid discouragement by disillusion, it was essential to remember that each method possessed only a relative value, and this again depended on a certain degree of efficiency being reached. The considered opinion of the Commission was summed up in the final resolution, which reads as follows:—

"The Commission considers that the first duty of administrations which have to organise anti-malarial measures is to provide for the treatment of the malarious sick with the additional object of reducing sources of infection."

Simultaneously, or subsequently, according to the circumstances and conditions of the various regions, a study of the causes of endemicity should be undertaken with the object of choosing and carrying out the most efficacious, the cheapest and best adapted method or methods in the solution of the local problem. Provision should also be made either for radical measures (large 'bonification,' drainage) or for other temporary measures (anti-larval work).

The Commission is of the opinion that in all cases the use of mechanical protection and measures against the adult insects are desirable."

The Sub-Commission which dealt with certain aspects of malaria, discussed the following points:

(1) Utilisation of historical data for the epidemiology of malaria; criteria of reliability of these data; spontaneous decline of malaria in various countries of Europe.

(2) Criteria for the declaration of "malarious" zones.

(3) Habits of anopheles and their influence on the transmission of malaria; Anophelism without malaria.

(4) Influence of the mode of construction of the human dwelling on malaria prevalence.

With regard to the first of these points, the Sub-Commission shared the view expressed by the Commission and considered that, in general, historical records of mortality statistics "did not provide a good method of ascertaining the distribution and character of malaria, and that the results of their use, as an indicator of success in anti-malarial measures, might be very misleading."

With reference to the declaration of malaria zones, the Sub-Commission was in agreement with the opinion of the Malaria Commission that this declaration should depend on reports received from district Government Medical Officers notifying the occurrence, simultaneously or at brief intervals, of two or more first attacks of malaria, due consideration being also given to the presence of malaria-carrying mosquitoes and of breeding-places.

Finally, under the last two headings, a number of possible lines of research were suggested by individual members as follows:—

I. *Studies Relating to the Biology of Anopheles.*

(1) Pathogenicity of the various plasmodia to anopheles; can an intense infection produce sterilisation of the mosquitoes and modify the migration of these insects?

(2) Domestic malaria and proofs of the permanent domesticity of anopheline carriers of malaria.

(a) Domesticity of the various species of anopheles.

(b) Changes in adaptation of anopheles of a given species according to the varying conditions of their "habitat."

(c) Means of estimating the degree of domesticity of a given species of anopheles.

(d) Importance of "peridomestic" collections of water and their relationship to the "habitat" of adult anopheles.

(3) Study of certain facts influencing the biology of anopheles and their relationship to the efficacy of anti-larval measures:

(a) Degree of permanence of collections of water used as breeding-places.

(b) Mechanical limitation of the migration of anophelines:

(i) Length of flight.

(ii) Altitude.

(iii) Wind and other meteorological factors.

(iv) Forests, etc.

(c) Biological obstacles to the migrations of mosquitoes.

(i) Inhabited houses.

(ii) Stables, animal sheds, etc.

(4) Study of the various factors which cause "anophelism without malaria," i.e., which prevent the local anophelines from acting as malaria vectors.

This enquiry should be carried out particularly in districts where the phenomenon occurs and which border upon areas where malaria is endemic. Efforts should be made to ascertain whether any of the factors claimed to be the cause of the phenomenon are operative in the country under observation and the investigation would be especially concerned with the following subjects:

(a) Differences in the anopheline density of the malarious and non-malarious regions.

(b) Morphological and biological differences of the anopheline population of these regions; especially with regard to selection of food (animal or human blood), shelter (animal or human habitations), and breeding-places (hydro-telluric conditions).

(c) Differences in relation to receptivity, of both anopheline faunas, with regard to malarial infection.

(d) Differences in relation to the human host and its surroundings;

(i) Numerical relationship of anophelines in contact with man and animals in stables, especially such animals as may be shown to be attractive to anopheles by means of the precipitin test.

(ii) Conditions of housing, especially with regard to the shelter offered to anopheles.

Note.—It is understood (1) that these factors are not necessarily the same in the various regions; (2) that it is essential for the present not to take it for granted that an explanation obtaining in one region holds good in another, however feasible it may be; (3) that it is only after the determination of such factors in many localities that it will be possible to determine the fundamental cause of the phenomenon.

II. *Studies Relating to Malaria in Man.*

(1) Possibility of persistence of the capacity for evolution of gametes derived from an individual treated with quinine. This knowledge is necessary for an accurate estimation of the value of quininisation in infections by the various species of plasmodia.

(2) Climatic and seasonal influences on schizogonic development of the various plasmodia.

(3) Study of hæmoglobin in the course of malarial infection and during treatment.

(4) Determination of a method of distinguishing:

(a) Primary infections.

(b) Re-infections.

(c) Relapses.

III. *Studies Dealing with Anti-Malarial Measures.*

(1) Factors in the so-called "spontaneous regression" of malaria:

(a) Value of the data on malaria contained in vital statistics.

(b) Experimental study of the factors involved in "complete bonifications" in the diminution of endemic malaria.

(c) Influence of ricefields.

(d) Influence of the cultivation of other irrigated crops.

(2) Study of the various methods of destroying anopheles in dwellings without injuring the contents of the rooms.

(3) The determination, in each country and region, of the domestic animal which attracts anopheles most and the correlation between this fact and malaria prevalence.

(4) Is the development of zygotes inhibited by the absorption of animal blood by the infected anopheles during this development?

Emphasis was also laid on the desirability of undertaking an international study of house construction in relation to anophelism and malaria, the study to include the construction of stables and the relationship between stables and human dwellings.

The Sub-Commission on Quinine considered the following questions:

I. The dosage of quinine and the duration of treatment. The grounds upon which these figures are based. Standard treatment and its effects.

II. Experiments with other cinchona alkaloids.

III. Use of drugs other than quinine, with special reference to plasmochin.

Under the first heading, the first Commission fully discussed the distribution of quinine as a social problem. With reference to dosage, the Sub-Commission expressed the opinion that due regard should be paid to the form of the parasite, the nature of the disease and the character of the epidemic.

It is essential to continue treatment after the attack has been cured, but treatment should not be continued for more than four to six weeks, and large doses are unnecessary. The Sub-Committee thought that a daily dose of 1 gram of quinine for an adult should be sufficient for consecutive treatment, and that the latter half of this treatment should be interrupted for three or four days each week during which no quinine should be given.

With reference to the second point the Sub-Commission considers that:

Experiments should be continued with various samples of kinetum extracted from different varieties of bark, more or less rich in quinine, and with the various secondary alkaloids. The scope of these investigations should be enlarged so as to include a trial of these drugs for intensive treatment.

With reference to the third heading, the Sub-Commission urged the necessity of a study of the value of plasmochin and quininstovarsol in the treatment of malaria—the enquiry being carried out in hospitals or in circumstances permitting of direct daily medical supervision.

The following are to be asked if they would be willing to undertake this study:—

Professor Ascoli	.. Italy
Professor Nocht	.. Germany.
Colonel Christophers	.. India.
Professor De Langen	.. Netherlands East Indies.
Anti-Malaria Service of	Madagascar.
Dr. Barber	.. U.S.A.
Professor Pittaluga	.. Spain.
United Fruit Company	.. Central America.
Professor Ciuca	.. Roumania.

The Sub-Commission further recommended that investigations be carried out in different countries to ascertain the practical importance of the intensive treatment by quinine of patients suffering from malaria, as a general prophylactic measure against this disease.

In the final meeting of the full Commission, after some discussion, the reports of the Sub-Commissions as outlined above, were adopted in their entirety together with the following programme of future work.

I. Housing in Relation to Malaria.

Documentation on this subject is to be collected by the Secretariat particularly with reference to tropical and southern countries. Messrs. Evans and Bonamico are to draw up on the basis of this documentation a plan for further systematic study.

Dr. Hackett made a proposal which can be classed as a chapter in the study of the above subject, namely, the investigation of the degree of contact between anopheles and man in areas of different malarious intensity:

(a) Ratio of anopheles in stables to those in bedrooms;

(b) Proportion of anopheles that bite human beings (precipitin test).

The following four groups are to be asked to undertake this experimental and epidemiological study:

Professor Brumpt and Professor Carlos Chagas.
Stazione Specimentale in Rome and Dr. De Buen.
Colonel Christophers and Dr. Kligler.
Dr. Mafey and Dr. Sfarci.

II. Systematic and Biological Study in Europe and in America of *A. maculipennis* and of *A. quadrimaculatus* in their Relation to Malaria Transmission and Prevention.

This study was entrusted in the first place to a group of laboratories in the United States of America to be designated by the United States Public Health Service and the International Health Division of the Rockefeller Foundation, on the one hand, and to the Institute of Tropical Medicine, Amsterdam, and Colonel James's laboratory in England, on the other hand.

When sufficient progress has been made, the collaboration of further laboratories is to be invited on the basis of the first provisional report. In the meantime, the Commission suggests that those members who would be willing to engage in the experimental studies of this subject might forward their observations to the Secretariat for communication to the first group of workers.

III. A plan was drawn up for the study of the practical importance of intensive quinine treatment of malarious sick, considered as a preventive measure in a malaria campaign.

This plan included:

(a) A critical study of the data available up to the present.

(b) Epidemiological and statistical study of the frequency of pre-epidemic relapse in individuals who have undergone an intensive quinine treatment.

These two studies are to be undertaken by the Secretariat who will obtain such advice and invite such expert collaboration as may be found to be necessary.

(c) Experimental study of the effects of treatment on:

(1) The time of appearance, the persistence, the rhythm of reappearance and the number of gametocytes.

(2) The possible loss of evolutionary capacity of the gametes found in treated persons.

This experimental study can obviously only be undertaken by laboratories in intimate and constant contact with hospitals able to supply sufficient clinical material. The following three groups of workers are to be asked to undertake this work:

(1) Professor Nocht, for the Hamburg Institute of Tropical Hygiene.

Professor Ascoli, Professor Ottolenghi for the Clinics and Hospitals in Italy.

(2) Colonel Christophers, for the Institutes of British India.

Dr. Kingsbury, for the Institutes of the Federated Malay States.

(3) Professor Pittaluga, for the Hospitals and Clinics in Spain.

Dr. Sergent, for the Institutes in Algeria.

The other suggestions contained in this report as to proposed studies are to be classified and brought to the attention of members of the Commission and other malarialogists. Should such studies be undertaken, the Commission would be glad to be informed from time to time of the progress made.

Portal Cirrhosis Associated with Chronic Inorganic Arsenical Poisoning: Report of two cases.

By PAUL A. O'LEARY, M.D.,

ALBERT M. SNELL, M.D.,

and

EDWIN G. BANNICK, M.D.

(*Jour. Amer. Med. Assoc.*, June 9, 1928, p. 1856.)

THE damaging effects of organic arsenical compounds on the liver have been known for some time but hepatic lesions, following the exhibition of inorganic arsenic, are of much less frequent occurrence. The two cases reported by the authors are therefore of some interest.

Case 1.—A farmer, aged 52, first observed in November 1926, had been complaining of abdominal distention for six weeks. The familial and marital histories did not have any bearing on the condition, and the patient was not addicted to the use of alcohol. He had gone through the usual infectious diseases of childhood, and influenza and pneumonia in 1918. In 1921 generalized dermatitis appeared, which was characterized by the formation of wheals, vesicles and blebs. The itching and burning caused extreme discomfort. Dermatitis herpetiformis had been diagnosed elsewhere but the disease had not been relieved. He had taken arsenic, which had been prescribed in one form or another for about four years; during one year he recalled taking solution of potassium arsenite in doses of 10 minims (0.6 c.c.) three times daily. For some time before he had noticed pigmentation of the skin and "wartlike growths" on the palms and soles. In October 1926, he was seized with cramp-like pain in the lower part of the abdomen and general malaise; within forty-eight hours the abdomen began to increase rapidly in size; with the abdominal distention definite shortness of breath on exertion developed, but the pain subsided.

The patient was mildly dyspnoic and emaciated. The skin of the trunk showed extensive speckled pigmentation of the arsenical type and there was marked arsenical keratosis of the palms and soles. The characteristic

pigmentation of dermatitis herpetiformis was obscured by the arsenical pigmentation. Many excoriated plaques, papules, wheals and groups of vesicles and bullæ were noted on the trunk and thighs. The pupils were regular and equal and the fundus oculi normal in appearance; the teeth were in poor condition and the tonsils were small and atrophic. The thyroid gland was not palpably enlarged and there were no enlarged lymph nodes except a small one in the left axilla. The heart seemed to be displaced upward but was otherwise normal; the lungs were clear except for slight dulness at both bases. The abdomen was greatly distended with fluid: no organs or masses could be made out. A few enlarged veins were observed over the lower part of the abdomen. There were no hemorrhoids of any consequence. The deep reflexes were normal and the genitals, extremities and rectum were normal. Urine analysis, blood counts, a blood Wassermann test and chemical studies of the blood were not productive of anything abnormal. The stools did not contain parasites or ova. The roentgenogram of the chest was negative except for thickened interlobar pleura on the lower right side.

A tentative diagnosis of dermatitis herpetiformis and portal cirrhosis due to chronic arsenical poisoning was made. Because of the possibility of abdominal carcinomatosis, however, it was decided to perform a biopsy on the lymph node from the left axilla, to be followed by abdominal exploration if the node did not prove to be malignant. The node was reported inflammatory by the pathologist. When the abdomen was opened a large quantity of clear yellowish fluid escaped; careful examination of the abdominal viscera was negative except for definite cirrhotic changes in the liver, which were described as being of the hobnail type. A Talma-Morrison operation was then performed, a piece of omentum being sutured into the space between the peritoneum and the posterior sheath of the right rectus muscle. The patient made an excellent recovery but returned for a second time in January, 1927, because of mild abdominal distention. The dermatitis herpetiformis had improved greatly. Ascites was only moderate, and in general the patient was quite comfortable. He was readmitted to the hospital, January 3, 1927, for a trial of treatment with diuretics. Re-examination and repetition of the laboratory studies did not reveal any new abnormality. Tests of hepatic function with bromsulphalein were negative and the serum bilirubin was normal in amount. Since the patient was anxious to return to his work, treatment was instituted at once, ammonium chloride being given in a dosage of 6 gm. daily and three doses of merbaphen (0.5, 0.75 and 1 c.c., respectively) being given intravenously on the first, third and fifth days. There was a satisfactory diuretic response, the patient losing 10 pounds (4.5 Kg.) in weight and the ascites disappearing promptly. Even with the abdominal cavity "dry," no enlargement of the liver or spleen could be made out. The bromsulphalein test when reported showed slight dye retention, graded 1.

After dismissal the patient had variable success in controlling the ascites for several months, but gradually this condition became less troublesome. Except for the persistence of the dermatitis herpetiformis, he apparently had made excellent progress.

Case 2.—A farmer, aged 41, was admitted to the Mayo Clinic, April 30, 1927, complaining of weakness, extreme fulness and distress in the abdomen, and diffuse pigmentation of the body. The family history was unimportant, and the previous history was essentially negative. He had been a moderate user of tobacco and had used very little alcohol, none in the previous four or five years and only rarely before that time. The patient had been employed in a copper smelter from 1913 to 1921. He stated voluntarily that the vegetation in the community was sparse because of the irritating fumes produced in the smelting process. During the last few years of his work in the smelter he had noticed that his eyes watered and that there was some swelling of the lids, especially noticeable in the morning. In 1918 he had suffered from burning pains in the soles of the feet and similar discomfort in the calves of the legs, which appeared at intervals and finally caused him to give up his work

and start farming. He remained on the farm from 1921 to the time of his admission. In 1922, because of slight persistent pain in the feet and slight weakness, he was advised to take solution of potassium arsenite, which he did for about three months, in doses of 5 minims (0.3 c.c.) four times daily. This made his eyes water and he discontinued it. He continued with farm work without especial complaints, except that he did not seem to be as strong as he thought he should be. In April 1926, he again began the use of solution of potassium arsenite four times daily, and continued this for one year. Shortly after he began the use of this solution for the second time, he noticed slight pigmentation about the body but did not pay any particular attention to it. This pigmentation gradually became more and more prominent, and associated with it he noticed what he called "calluses" on the palms and soles. Two months before admission he began to notice definite anorexia and gradually swelling of the abdomen. As a result, he stopped the solution of potassium arsenite but the swelling of the abdomen continued and soon he noticed swelling of the ankles also. About two weeks before admission a large amount of clear fluid was withdrawn by abdominal paracentesis. When the fluid reaccumulated, he presented himself for examination.

The patient was somewhat underweight with marked ascites and moderate oedema of the lower part of the legs. There was diffuse, mottled brownish pigmentation of the "rain-drop" type over the entire body; it was more marked over the trunk and especially around the axillæ, the neck, the anterior aspect of the chest and the genitalia.

There was a mild degree of pigmentation in the mucous membrane of the mouth, a not unusual condition in arsenical pigmentation. There was marked arsenical keratosis of the palms and soles extending over the dorsum of the hand in some areas. The heart was normal in size, and no abnormalities of cardiac action were detected. The lungs seemed entirely normal. The blood pressure was 110 systolic and 70 diastolic. The abdomen was markedly distended with fluid. A few collateral venous channels were visible. The ascites prevented the possible palpation of organs or masses. Complete neurologic examination was entirely negative except for some tenderness in the calves, which, when considered with the history of ingestion of arsenic, suggested the possibility of arsenical neuritis. Urine analysis and a blood Wassermann test were negative. Hemoglobin was 70 per cent. (Dare); erythrocytes numbered 3,940,000 and leukocytes 8,600. The blood urea and creatinine values were normal. A phenolsulphonphthalein test showed 50 per cent. return of the dye in two hours; an electro-cardiogram did not show any changes of significance. A test of hepatic function performed with bromsulphalein showed absence of dye retention; the serum bilirubin was 0.5 mg. for each hundred cubic centimetres. The same tests repeated three weeks later showed dye retention, graded 1, but no change in the serum bilirubin content. The fasting blood-sugar and dextrose tolerance tests were within normal limits. Urine specimens examined nearly every day were positive for arsenic, there being on an average about 10 mg. of arsenic for each thousand cubic centimetres of urine.

The treatment instituted consisted of a low-salt, low-fluid type of diet, ammonium nitrate by mouth in doses of 6 gm. daily, and injections of merbaphen intravenously at intervals. The satisfactory diuretic response and gradual loss of weight coincided with complete disappearance of oedema and ascites. In a small piece of skin removed from the axillary fold the Osborne stain revealed granules which have been considered to be arsenic sulphide. Mallory's iron stain showed also deposits of hemosiderin about the sweat glands.

The diagnosis was arsenical dermatitis, cirrhosis of the liver with ascites (probably due to arsenic) and probably a mild degree of hæmachromatosis. Since the urine still contained a considerable amount of arsenic, a course of sodium thiosulphate was indicated as a possible means of increasing the elimination of arsenic and thus protecting the liver, especially, against further

injury. This drug was given intravenously in doses of 1 gm. on each of ten successive days. During the first half of this period the amount of arsenic in the urine was definitely increased and then the excretion gradually fell to the previous constant level. The patient was dismissed, June 9, feeling much stronger, free from oedema, and without demonstrable free fluid in the abdomen.

In two cases of chronic arsenical poisoning, after the cutaneous changes were well established, ascites and other signs of portal cirrhosis appeared. It is suggested that such cases represent a clinical entity; they may be described as arsenical cirrhosis. The changes known to occur in the liver in arsenical poisoning, the appearance of the liver at operation in one of the cases described and the occurrence of similar cases in epidemic arsenical poisoning may be cited in support of this view. A favourable response to treatment was noted in both cases.

Dangers of Hasty Generalisation.

(An abstract from an article "On the Value of the Statistical Method in Practical Medicine.")

By PERCY STOCKS, M.D., D.P.H. (Camb.)

(*Lancet*, June 16, 1928, p. 1243.)

I do not need to quote examples to show how often in the past, over long periods of years, tens of thousands of patients have been subjected to some form of treatment in the erroneous belief that it had been proved to be beneficial, whereas an application of statistical methods at an early stage might have shown that it was useless. It is by this kind of thing that the progress of medicine has been so often retarded and much expensive effort wasted; some medical practitioners attribute the cure of a malady to a particular treatment because they have seen it associated with that event in a few cases; others attribute it to another treatment for the same reason, whereas both are mistaken in having hastened to generalise whilst overlooking the normal expectation of coincidences, which could easily be measured by the theory of probability. Most diseases have been attributed to chills and syphilis on this account.

The Work and Responsibilities of the Pathologist.

(An extract from a lecture delivered by Sir Bernard Spilsbury to the Research Defence Society.)

(*Brit. Med. Journ.*, June 23, 1928, p. 1079.)

At the outset Sir Bernard Spilsbury defined a pathologist as a specialist in the study of the scientific aspects of disease, including the essential cause, the changes, visible and microscopical, produced, and the reactions provoked in the patient. The growth of scientific knowledge and of the laboratory method of investigation during the last fifty years had greatly increased the pathologist's labours and had brought about the division of the work between the pathologist (in the narrower sense of the term), the bacteriologist and the chemist.

Sir Bernard Spilsbury then gave a few illustrations of the achievements of pathology in the study of the causes and processes of disease. The first was what he called the "romance" of anthrax. This disease had been recognized from very early times; the murrain of cattle recorded in Exodus was supposed to have been anthrax. In the middle of the last century the observation was made that minute bodies were observed microscopically in the blood of animals suffering from this disease, and it was stated that the blood which contained these bodies would produce the disease when injected into the healthy animal. The matter was still in dispute when Koch, in 1876, then a country practitioner in Germany, devised a method of growing the organism outside the body in broths and jellies, showed that these cultures had distinctive characters, and was able to

reproduce the disease in healthy animals by injection. Koch's proof of the cause of anthrax was utilized by Pasteur, who had already begun his investigations on infectious disease, and he developed a method of protecting animals against infection. He experimented with cultures of the anthrax bacillus until he so reduced the virulence that on injection of the attenuated cultures into the healthy animals, those animals developed protective powers which enabled them to resist subsequent injection of virulent organisms. The result of the widespread adoption of protective inoculation was that the mortality in cattle and sheep from this cause had greatly diminished; in France it had been reduced to one-twentieth of what it was before inoculation methods were adopted.

Another illustration was hydrophobia, where Pasteur found that the virus was always present in the spinal cord of rabbits used in experiments, and that healthy dogs could readily be infected by injections made therefrom. He also found that the virus lost its strength with keeping, until after a time it failed to reproduce the disease on inoculation. Taking advantage of this fact, he injected into patients who had been bitten by rabid dogs preparations from the spinal cord of the experimental rabbits, using first very attenuated virus and repeating the injections with matter of increasing virulence, thus protecting the patient before the original disease had time to develop. The results of this treatment carried out in the Pasteur institutes in various parts of the world had been to reduce the fatalities to less than 1 per cent. of the patients treated.

In some infections the protective power was resident in the blood, and patients were treated by the injection of the serum of an animal which had been immunized against that particular infection. The immunization had been obtained by giving the animal a series of injections containing the organism or its specific toxin in carefully graduated doses, so that it developed substances which counteracted the effect of the poison and presently gained complete protection. One of the most important applications of serum treatment was to diphtheria; it had been clearly proved that the mortality was greatly reduced by injection of the specific serum, especially if the patient was treated at an early age.

Part of the pathologist's routine work was to diagnose infectious disease by the discovery of the organisms, but in some cases microscopical examination of the suspected material failed, and recourse had to be made to animal experiments. In early and obscure cases of tuberculosis, for example, to search for the organism by microscopical means was like searching for the needle in the haystack. In such cases injection of suspected material was made in the guinea-pig, which after a time was killed, and if the tubercle bacillus had been at work the characteristic changes were found. Another difficulty with which the pathologist had to contend was that some bacteria which produced specific disease had their innocent "doubles," and again it was animal experiment which enabled the problem to be solved.

A good deal of misconception existed with regard to animal inoculation. In the vast majority of cases the animal suffered no worse effect at the time of introduction of the material than the soon forgotten prick of the hypodermic needle. In some cases the development of the disease led to speedy death; in others, as in tuberculosis, the animal would presently show slight signs of disease sufficient to indicate that it should be destroyed and its dead body examined. It was only in a very small proportion of cases that serious suffering in the sense of pain attended inoculation experiments, and even then it was usually short-lived owing to the rapid progress of the disease.

Sir Bernard Spilsbury then mentioned some chemical problems which were presented to the pathologist, how, for example, by animal experiment, tetra-chlor-ethane was incriminated as the liver-damaging element in aeroplane "dope" during the war; also how experimental methods, again on animals, afforded the information required as to the hygienic measures to be adopted in factories against poisoning by T.N.T. Again, the experimental work by Dr. J. S. Haldane in connection

with carbon monoxide gas indicated the mechanism by which this form of poisoning acted, and his experiments on mice demonstrated once and for all the proper method of treating those who were suffering from its effects.

Practically the whole of bacteriological knowledge was based upon experimental work—inevitably so in the present state of affairs, for there were no means of testing the suspected organism except by the reproduction of the disease in living animals. The same was true of the diagnosis of disease. Every pathologist who worked alone, in a small hospital, found himself compelled to have a Home Office licence for vivisection if he was to do his duty to the patients in the diagnosis of obscure disease. For that reason, in recent years, the number of licences granted to pathologists all over the country had greatly increased. But chemical problems also required animal experimentation in such matters, for example, as the testing of new drugs. The pathologist was a medical practitioner, who, like his clinical colleague, had to apply his skill and knowledge to the best advantage on behalf of the patients. He must avoid error as far as possible, and must employ exact methods, including, at present, animal experiment. The scientific advances of the last fifty years, very largely based on experiment, had gone far to revolutionize the treatment of disease, so that there were some diseases, formerly rampant, with which the modern practitioner was scarcely acquainted. If only our forebears of last century could see the work which had been done in modern science and medicine, how they would exclaim at the enormous amount of suffering which, had they possessed the knowledge in their day, would have been prevented!

Diagnosis of Early Tuberculosis.

(*Medical Press*, June 27, 1928, p. 517.)

THERE is no diagnosis of major importance which is beset with so many difficulties as is the recognition of pulmonary tuberculosis in its earliest stages. Moreover, the physician is necessarily hampered by the fact that, his patient—whether or not he asks the direct question—has as a rule knowledge enough of the possible significance of his symptoms to share the doctor's anxieties, and to demand, not merely treatment, but a definite and unequivocal diagnosis. Very different it is, as a rule, in the case of cancer. At the stage when the patient's own suspicions have been aroused it is usually no very hard matter for his doctor to form a definite opinion on the case. At the stage when the doctor finds it well-nigh impossible to make a definite diagnosis for or against malignant disease, the patient is, as a rule, unconscious how serious an interpretation his symptoms may have. Where the diagnosis of tuberculosis is genuinely in doubt, and where it is of importance that if the disease exists the patient should make a radical change in his mode of life, it is the wisest course, we believe, to take the patient into our confidence. Where, on the other hand, there are strong reasons for not even raising the suspicion, and where, as in the case of a boy or girl not yet employed in a profession, a month's careful rest is not a very disturbing prescription, it is often necessary to give the definite assurance that no signs of disease are detectable in the lungs: a half-truth, but a necessary one. In this common difficulty it is surprising that doctors do not more often resort to guinea-pig inoculation. From four to six weeks is all that it is necessary to wait, and the inoculation provides at once the best chance of a positive bacteriological diagnosis, and the nearest possible approach to a negative one. When symptoms have cleared quickly it is of great importance to the patient to learn that his attack was really tuberculous; while when catarrhal symptoms persist without any tendency towards general symptoms, a negative inoculation is powerful support to the gradually dawning conviction that the affection of the chest is really non-tuberculous.

A Contribution to the Study of the Erythrocyte Sedimentation Reaction.

By COLONEL DAVID TOWNSEND, M.D.,

and

HELEN B. ROGERS, B.L.

(*Journ. Lab. and Clinical Med.*, June 1928, p. 819.)

THE authors tested the value of the erythrocyte sedimentation reaction in several thousand cases of whom the majority were tuberculous. Three different methods were used and the authors record the following conclusions:—

- (1) The erythrocyte sedimentation reaction is not specific for tuberculosis.
- (2) A parallelism exists between the severity of the disease and the increase in the sedimentation rate.
- (3) With improvement in the condition of the patient, the speed of sedimentation decreases; the opposite being true with increasing severity of the disease.
- (4) The phenomenon sometimes disappears shortly before death.
- (5) The sedimentation rate is not an index of the extent of the tuberculous involvement.

The Pupil Reactions.

By C. L. GIMBLETT, M.D., M.R.C.P., F.R.C.S.,

The Practitioner, June 1928, p. 354.

NOTES on the significance of variation in the size and of inequality of the pupils are quoted below:—

The Size of the Pupils.—The size of the pupils varies with age and the condition of the central nervous system as well as with accommodation and intensity of illumination. It is also affected by drugs.

(a) *Age.*—In infancy the pupils are contracted, in early adult life often widely dilated, while in old age they become, as a rule, small once more.

(b) *Central nervous system.*—Dilatation of the pupil occurs in emotions, such as anger or fear, and follows the excitation of sensory nerves. Constantly seen in the presence of pain, as in biliary or renal colic, it may be used as a test of its genuine severity. Anaesthesia provides a series of changes in the size of the pupils. During the first "excitement" stage they are dilated, in the second "surgical" stage contraction is present, while in the third stage—and in all states of "exhaustion" such as alcoholic coma and immediately preceding death—the pupils become widely dilated. During sleep, contrary to expectation, the pupils are constricted, the eyes are rolled upwards, and the visual axes convergent, hence the constriction is considered part of a synergic act.

(c) *Drugs.*—The actions of the alkaloids of atropine and cocaine to produce dilatation, and of those of pilocarpine to cause constriction, will be referred to when considering inequality of the pupils. The alkaloids of opium produce marked pupillo-constriction when given in clinical doses for the relief of pain—not by any local action on the pupil, for no constriction follows their instillation into the conjunctival sac, but by an effect upon the central nervous system (probably the basal ganglia).

Inequality of the Pupils.—The causes of inequality of the pupils, both in size and reaction, may be peripheral in the eyes themselves, or in the sensory and motor nervous paths or their central connections.

I. Locally in the Eye-ball.

(a) *Trauma*—not syphilis—is the commonest cause of inequality of the pupils. As the result of a blow—which need not have been severe—muscle fibres of the iris become torn. The pupil is permanently altered in size and sluggish in reaction; while its position is slightly eccentric and its margin irregular.

(1) The dilator pupillae tears at the periphery of the iris—its thinnest part—with the formation of a "black crescent" in this situation (iridodialysis). A view of the fundus can be obtained through this gap

as well as through the pupil. The segment of iris affected becomes inactive, and its margin irregularly flattened, the normal circular outline being lost.

(2) The constrictor pupillæ usually tears at the pupil margin; if severely, the pupil becomes widely dilated and entirely inactive to light, both directly and consensually, while it does not contract to accommodation. Such a pupil is *more* inactive than that of a blind eye.

Many lesser degrees of trauma exist in which only a few fibres are torn. Such a pupil—a little dilated, reacting sluggishly to light and contracting somewhat ineffectively to accommodation—is, far more often than is supposed, considered as due to syphilis.

(b) *Drugs*.—Clinical doses of the alkaloids of atropine, eserine, cocaine and perhaps adrenaline, are common causes of inequality of the pupils. Instillation is usually clinical, but may occasionally be accidental or even fraudulent. The presence of the drug alters visual acuity by affecting the ciliary muscle, which somewhat alarms a patient unaware of the cause of his sudden inability to use one eye. Accidental sources are liniment prescribed for lumbago, or eye ointment ordered for some other member of the family. The right eye is usually affected in such patients. The effect of atropine lasts ten days, and in an elderly person may result in a rise of intraocular tension, so that instruction as to the care of the hands should be given to patients using liniments. The nerve-endings in the muscles are the points of action of these drugs; atropine paralyses and eserine stimulates those of the third nerve in the constrictor, while cocaine and adrenaline stimulate those of the sympathetic in the dilator pupillæ—adrenaline only affecting the pupil in pancreatic insufficiency (Levi's test). When the pancreas is normal its internal secretion—present in the bloodstream is thought to neutralize adrenaline immediately upon absorption.

(c) *Inflammation*.—(1) Inequality of the pupils may be due to the presence of iris adhesions—synechiæ—characteristic of iritis, which are of frequent occurrence and often much more marked in one eye than in the other. A "quiet iritis" may occur and synechiæ form without the patient being able to give any history of a definite "attack." A drop of cocaine—by dilating the pupil—demonstrates the points at which the iris is adherent to the underlying lens.

(2) Within the eye-ball (apart from synechiæ) inequality of the pupils may result from glaucoma—increased intraocular tension—in which the pupil becomes dilated (midriasis), eccentric and inactive to light, and the visual acuity finally reduced to no perception of light. This condition is in many chronic cases unioocular, and unaccompanied by pain or conjunctival redness. The shallow anterior chamber, hard eye-ball and reduced visual acuity should make the diagnosis clear.

(d) *Neoplasm*.—Growths of the iris or ciliary body give rise to inactivity of the pupil by partially obstructing its movements. These growths are often quite invisible upon external examination, but inactivity of one section of the iris (apart from iridodialysis or the presence of an intraocular foreign body)—especially if there is irregularity in the depth of the anterior chamber—should make one suspicious. Intraocular neoplasms usually give no symptoms of any kind until a comparatively late stage.

Trypan-blue and Certain Dithio-Aniline Derivatives : Their Efficacy in the Treatment of Piroplasmosis and Other Affections in the Central Provinces.

By MAJOR R. F. STIRLING, F.R.C.V.S., F.R.G.S., N.V.S.M., F.Z.S., I.V.S.

Memoirs of the Department of Agriculture in India. March, 1928, p. 129.

PIROPLASMOSIS, or tick fever, is a disease of considerable importance in the Central Provinces. In unselected villages, the incidence of the infection in the animals examined was as high as 80 per cent. This

widespread infection of cattle is a point of considerable economic importance. The regular dipping of cattle in arsenical baths in order to rid them of ticks is a method which has met with considerable success in other countries, but is not suitable for use in India. Considerable success has been achieved by administering trypan-blue intravenously. A 2 per cent. solution in water is used, the dose for cattle being 40 c.cms. and for dogs 5 to 6 c.cms.

The Memoir deals with the clinical effects of this treatment. Exact figures are not quoted; an excerpt from the report is given below.

(a) "Its general value as a tonic is undoubtedly a great one. Many unthrifty animals put on condition after one or two injections of trypan-blue and its use is getting very popular with cattle owners. In milking cows, injections result in a better yield of milk and the quality and quantity of the butter is increased considerably. I have found it very useful in cases of chronic skin affections in dogs."

(b) "Its value as a general tonic is unparalleled. There have been many instances in which animals have shown wonderful improvement in condition after one or two injections."

(c) "In acute cases an injection of trypan-blue almost immediately brings down the temperature and clears the blood of piroplasms. Even if the blood is still free after seven days a second dose should be given. The present dosage is sufficient. In chronic cases, at least three doses are necessary at intervals of a week, or earlier if the mucous membranes show no blue staining. As a general tonic, it is much more useful than iron, arsenic, etc. Milch animals, which give an inferior quality of milk in spite of good food and tonics, yield a large quantity and a better quality of milk after injection. In two recent cases, a cow and a she-buffalo which had dried up almost entirely owing to unknown causes, animals started to give milk after the first injection. I am of opinion that for all debility cases trypan-blue should be adopted as a routine treatment whether parasites are found in the blood or not."

(d) "In acute cases of piroplasmosis early treatment with trypan-blue has been found efficacious in over 95 per cent. of cases. I have treated many cases of indolent ulcer, which defied all ordinary treatment, by means of trypan-blue injections combined with external dressings of an ordinary kind. Other chronic diseases of a constitutional nature such as recurrent colic and tympanitis showed rapid resolution when the dye was used in conjunction with ordinary medicaments which by themselves had failed to effect resolution."

Quantitative Determination of Quinine in the Blood.

By M. M. PANTSCHENKOW AND A. A. KIRSTNER,
Moscow University.

Arch. f. Schiffs- u. Trop. Hygiene. 1928.

Bd. 32, No. 3, p. 137.

(Translated by O. Urchs, M.D.)

THE determination of quinine in the urine was hitherto carried out by means of Giemsa's method (Giemsa and Schaumann, 1907, *Beih. z. Arch. f. Schiffs- u. Trop. Hyg.* No. 3). This method shows quinine in a dilution of 1:200,000, but the same cannot be employed in a medium containing albumen and is, therefore, not suitable for determining the quinine content of the blood.

After as large doses as five grammes Giemsa and Schaumann found only traces of it in the blood.

The above authors took advantage of the fact, that quinine becomes fluorescent if exposed to ultra-violet rays.

Their method is in short: 10 c.cms. of blood together with a certain amount of sodium bicarbonate are concentrated by evaporation on the water-bath. After 1½ hours this process is usually finished. The dried and carefully pulverised blood is shaken with 100 c.c. of ether and thereafter left alone for 24 hours. The ether is removed after 24 hours, replaced by another

100 c.cms. and this process is repeated a third time. All the three ether portions are collected in one glass vessel and filtered. The filtrate is very carefully concentrated through evaporation on the water-bath (danger of explosion!).

To the remaining portion 2 c.cms. of diluted sulphuric acid is added and the mixture is warmed slightly. After that it is put in a glass tube and under ultra-violet rays compared with a standard solution of quinine bisulphate. The room should be entirely darkened. As the quinine solution starts to fluoresce after about five minutes one has to wait accordingly.

The glass tube, which is used for the experiment, has to be tested first under ultra-violet rays, in order to avoid a glass which gives fluorescence in itself.

With this method the authors claim to be able to determine quinine even in a dilution of 1:200,000.

The results so far have shown, that erythrocytes contain more quinine than the serum.

Extract of Yeast.

By ULF VON EULER,

Pharmakol. Inst. Stockholm. Biochem. Zeitschr.

1928. Bd. 194, No. 113.

(Translated by O. Urchs, M.D.)

If yeast is extracted with 25 per cent. alcohol, which contains 1 per cent. hydrochloric acid, one obtains an extract which produces typical insulin-action after adding to fresh muscle pulp plus glucose plus phosphates (as buffer). After hypodermic injection of 0.05 gm. in a rabbit, the preparation does not produce any significant decrease of the blood-sugar. This failure of the result upon the blood-sugar is explained through the small proportion of active substance. In the experiments with muscle pulp the preparation is efficient only in much higher concentrations, compared with original insulin.

Reticulo-Endothelial System and Endocrinal Glands.

By LEITES AND RIABOW,

Laboratory for Pathol. Physiology, Charkow. Ztschr. f. d. ges. experim. Medizin, 1928, 59, No. 516.

(Translated by O. Urchs, M.D.)

AFTER the removal of the thyroid and ovarian glands the storage capacity of the reticulo-endothelial system (RES) can be increased through the administration of insulin or pituitrin. Adrenalin decreases the storage capacity; pancreas, parathyroid and testicles seem to be without influence upon the storage capacity of the RES, because the function of the RES is by no means affected by the removal of these glands. If spleen and ovarian glands are removed, the blocking of the RES takes place very quickly.

A Comparative Study of the Action of Cinchonidine and Cinchonine on the Heart.

By R. N. CHOPRA, M.A., M.D. (Cantab.),

LIEUTENANT-COLONEL, I.M.S.,

B. B. DIKSHIT, M.B., B.S. (Bombay), D.P.H. (Cal.),

AND

J. C. DAVID, M.B., B.S. (Madras).

Indian Journ. Med. Res. July, 1928. Vol. XVI. p. 125.

SINCE the introduction of cinchona bark into therapeutics considerable experimental work has been done on two of its alkaloids, namely, quinine and quinidine, but little attention has been paid to cinchonidine and cinchonine. These latter alkaloids have been passed over with the remark that they have the same action

as quinine. Fredricq and Terroine working with cinchona alkaloids on the isolated turtle's heart found that all of them diminished the frequency and amplitude of the heart beat, producing a diastolic arrest, and that lævo-bases were more powerful than their dextro-rotatory isomers. De Arric (1912) found that the turtle's heart was slowed by all doses and the amplitude was decreased by the higher concentrations but increased by the lower ones. McGilchrist (1914) made an extensive experimental study of the cinchona derivatives and strongly advocated the use of cinchonine in benign tertian malarial infections. He made a comparative study of the toxicity of the four chief alkaloids of cinchona bark on guinea-pigs and found that cinchonine was the most toxic and cinchonidine the least. The protozoicidal action of cinchonine, however, was so marked that in spite of its higher toxicity its use against malaria was advocated. Post-mortem examination of guinea-pigs showed that both after cinchonidine and cinchonine the heart was stopped in systole. Biberfeld (1916) found that in mammals and man the cinchona alkaloids quickened the pulse and produced a rise of blood pressure. Cushney described cinchonidine and cinchonine as possessing the same action as quinine and said that the former is more liable to produce symptoms of poisoning. Aeton (1922) in his researches on the cinchona alkaloids, pointed out that quinidine and cinchonine were dextro-rotatory while quinine and cinchonidine were lævo-rotatory; he therefore suggested that the nomenclature was defective. After an experimental study on the toxicity of these alkaloids he came to the conclusion that cinchonidine was less toxic than cinchonine. He quotes Cushney as saying that cinchonidine is more liable to produce symptoms of poisoning, and remarks that Cushney evidently means cinchonine when he writes cinchonidine. Clerc and Pezzi (1923) observe that all the cinchona alkaloids paralyse the bulbar centre of the vagus. They further state that the acceleration of the heart caused by small doses of these drugs is due to excitation of accelerators and not to paralysis of the pneumo-gastric, which requires larger doses. Sollmann (1926) in his text-book on pharmacology, describes the action of cinchonidine and cinchonine as resembling that of quinine but says that the two former are endowed with less of the desirable effects and more of the undesirable side-effects. He further observes that cinchonine is much more depressant to the heart and more toxic than cinchonidine.

It will be seen therefore, that a good deal of discrepancy exists between the findings of various observers. Some have credited less toxicity to cinchonine, while others signal it out as the most toxic. In this paper we propose to investigate the action of these two alkaloids on the heart.

Summary and Conclusions.

(1) Intravenous injections of cinchonidine in animals produce a marked depression of the amplitude of auricular and ventricular contractions accompanied by a fall of blood pressure. The irritability of the myocardium is markedly decreased, the latent period and the refractory period are both lengthened.

(2) Cinchonine produces an apparent stimulation of the auricle and a depression of the ventricle. The former effect is shown to be produced by depression of the inhibitory nervous mechanism and the latter by direct action on the heart muscle. The irritability of the myocardium is decreased but not to the same extent as with cinchonidine. The latent period is not increased in frog's heart muscle and the refractory period is not appreciably affected.

(3) Both cinchonine and cinchonidine temporarily restore the normal rhythm of the heart after it is experimentally made irregular with aconitine. This is partly due to the depression of the vagal mechanism and partly to direct depression of the heart muscle.

(4) Our experiments show that the lævo-rotatory alkaloid cinchonidine has a more powerful depressant action on the heart muscle than the dextro-rotatory cinchonine.

Reviews.

THE GENESIS OF EPIDEMICS AND THE NATURAL HISTORY OF DISEASE.—By Lieut.-Col. C. A. Gill, M.R.C.S. (Eng.), L.R.C.P. (Lond.), D.P.H., D.T.M. & H. (Eng.), I.M.S. London: Baillière, Tindall and Cox, 1928. Pp. xxvi plus 550, with 18 charts, 10 maps and 1 diagram. Price, 21s. net.

In a province like the Punjab, where general and localised outbreaks of malaria, plague, cholera, relapsing fever, influenza or other epidemic diseases have occurred with such frequency in the past, the opportunities for the study of the genesis of epidemics are very great. An exposition of this subject by an officer who has spent so many years in the Public Health Department of this province, and who has made a special study of epidemiology in all its varied aspects is something to be welcomed. Those of us who have known that this book was in the process of compilation have looked forward with great interest to its publication and have not been disappointed in the result.

Epidemiology has been studied by many methods—the historical, the parasitological, the statistical, the experimental and practical—and as in any scientific subject which has many aspects, the tendency has been to consider the special method used as the most important one and the others of minor value. In this way any true picture of the facts is liable to be obscured. In the book under review an attempt has been made to consider the subject from all points of view, and Colonel Gill with his extensive field, statistical and laboratory experience of epidemic diseases, more especially malaria, is eminently suited to perform this task.

The theory of the genesis of epidemics, which forms the subject of this book, was first advanced by the author in 1914, in connection with epidemic malaria, and since that time he has had ample opportunity of continuing his investigations and of testing the applicability of the hypothesis to epidemics of other diseases.

The hypothesis states that "the genesis of all epidemics is a loss of equilibrium between infection and immunity and that the essential factor in this loss is of a quantitative nature rather than a qualitative one." The causes of this disturbance of equilibrium may vary in different diseases, but the essential mechanism is the same.

This 'quantum' theory postulated that four factors—the reservoir of infection, a parasite factor, an immunity factor and a transmission factor—are concerned in the mechanism of all epidemics, and that the factor of predominant importance in determining the character of communal disease is the last. It is with regard to the influence of meteorological conditions on these factors that a large part of the work is concerned. With the discovery of micro-organisms as the causes of infection, the 'airy influences' of Sydenham and the 'miasmatic theory' of older workers, were considered to be minor or negligible factors in disease, but Colonel Gill has shown, not merely by theoretical considerations but by actual experimental evidence in the case of malaria at least, that the 'climatic factor' is one which plays a marked part in the natural history of disease.

The hypothesis has been greatly strengthened by the fact that it has stood the test of practical application in the case of epidemic malaria, in that it has formed the basis on which it has been possible to forecast with a very considerable degree of accuracy the occurrence of localised epidemics of this disease in the Punjab. This is a very severe test for any hypothesis which is not founded on a sound basis.

The book is divided into five parts of which the first or introductory one gives definitions of the terms used, and, after reviewing the ancient and modern theories regarding the causation of epidemics, ends with a brief exposition of the 'quantum' theory.

The second part is concerned with the natural history of three great epidemic diseases—malaria, influenza and plague. These three diseases have been chosen because they afford examples of different methods of disease transmission—malaria is carried indirectly by insects,

influenza is spread directly, while plague in its bubonic form is carried indirectly and in its pneumonic form directly.

Colonel Gill's previous work on malaria should need no introduction to those engaged in the study of this disease. In the present volume he has included the relevant portions of his work on the genesis of malarial epidemics and on meteorology in relation to the spread of this disease. In addition he has recorded the details of such new and original work, in confirmation and extension of the observations on which he originally founded his 'quantum' theory. By means of his malarial forecasts, it has been possible for the first time to study an epidemic of malaria from the pre-epidemic period right through its height and on to the post-epidemic period. In this way very valuable information has been obtained with regard to the behaviour of the four factors mentioned above. In the past, too much work on malaria has been done of a qualitative rather than a quantitative nature, but here we have work in which precise measured data play a predominant part. It is such quantitative work which is needed to further the study of epidemiology and make it a more exact science.

In the chapters dealing with influenza, the influence and relationship of the factors postulated in the 'quantum' theory have been considered in detail, more especially in connection with the epidemics which have occurred in the British Isles and in India. Here, again, has been collected much evidence that such epidemics are the result of a disturbance of the equilibrium between infection and immunity. As in the case of malaria, meteorological conditions appear to play an important rôle.

In the case of epidemic plague, the four factors of the 'quantum' theory have been considered in relation to the experiments and observations of many workers on this subject, and it has been shown how the varied findings of these researches can be fitted into their appropriate places in the theory. Again as in the other diseases considered, climatic conditions appear to have an important relationship to the spread of this disease, in both its bubonic and its pneumonic forms.

Part III deals with the general properties of epidemics and shows how the 'quantum' theory affords a rational explanation of the genesis of epidemics, as far as the facts relating to these are available at the moment.

The author does not maintain that the accuracy of the hypothesis has been established for all diseases, although the evidence in the diseases mentioned is very strong, but that it is a rational explanation of the nature and significance of all epidemical phenomena, founded on a reasoned and reasonable basis. Although many of the conclusions may need confirmation by observation and experiment, it can at least draw attention to these unsolved problems and indicate lines along which investigations may profitably be directed.

The fourth part of the book is concerned with the bionomics of disease and here are considered evolution in relation to disease and the effects of climate on health and disease.

The last part of the book gives some final reflections on the problems which have been discussed.

One finishes the book with the feeling that the author is one of those who is not content to accept the *ex cathedra* statements and surmises of authority, when it is possible to deal with facts, which attitude should be one of the fundamentals on which all true research is built.

This is a book which should be in the library of every student of public health and of every malariologist. It is not a book to be skimmed lightly but to be carefully read from cover to cover. Even if the reader does not—and he probably will not—agree with all the views enunciated, he will find in it a store of very valuable information and technical detail, much food for thought and many original ideas for further research on the epidemiology of disease.

The book is well produced and printed. The misprints are few in number, the main and almost only one, is "*Anopheles hyrcanus*" for "*Anopheles hyrcanus*."

J. A. S.

Nov., 1928.]

MODERN METHODS OF TREATMENT.—By Logan Clendinning, M.D. Second Edition. St. Louis: The C. V. Mosby Co., 1928. Pp. 815, with 95 illustrations. Price, \$10 net.

THE object of this book may best be defined by quoting from the author's preface to the first edition. "A book on treatment should give a method of procedure so clearly and minutely that a person who has never heard of it could do it from the description." This is the view-point that the author and his collaborators (for the volume is not entirely the work of Dr. Clendinning), have kept steadfastly before them and the result is eminently satisfactory.

The first 184 pages are devoted to rest and drugs in the treatment of disease and in these days of polypharmacy it is indeed refreshing to discover a physician who does not suffer from mental nystagmus as a result of the never-ending succession of complex synthetic preparations that flash across the field of view and who appreciates to the full the virtues (and short-comings) of the tried and trusted remedies—the arsenicals, mercury, quinine and digitalis. The author, however, is no reactionary and recent therapeutic advances of proved merit, as for example the use of ephedrine, of novasurol, and of mercurochrome-220 receive appropriate mention.

The author definitely states that the book does not deal with the treatment of tropical diseases and hence no attempt has been made to incorporate the latest advances in the field of tropical medicine. The practice of introducing each of the principal drugs with a brief historical note adds materially to the interest of this section of the book.

Chapters III and IV are devoted to a consideration of biologic therapy and of organotherapy respectively, and the author adopts a very reasonable attitude towards both subjects. It certainly requires more than the average amount of courage to prepare a table such as that shown at p. 187 in which no fewer than nine biological products, enjoying either singly or collectively considerable vogue in different circles are included in a column headed "value negative." The section on dietetics and infant feeding is very comprehensive, taking up nearly 100 pages, and, as might have been anticipated in a work of American origin, it includes a very up-to-date account of the dietetic treatment of pernicious anemia evolved by Murphy and Minot. The subject of hydrotherapy is particularly well handled and this is one of the few books which in our experience gives adequate information on such common and necessary procedure as the wet pack, the compress and the enema.

Dr. Clendinning is a psycho-therapist with a rational outlook: he recognises the fact that it is on occasion necessary to treat the patient as well as his disease, but he carefully avoids being drawn into the Freudian controversy and his exposition of the whole subject is gratefully free from the sexual note which characterises the refrain of the more enthusiastic devotees of the cult of psycho-analysis. Part II of the volume is devoted to the application of therapeutics to particular diseases and the various subject comprehended in this section are treated on more or less conventional lines.

If we have one major criticism to offer, it is that there is at places a suggestion of a want of balance. For example, the treatment of infectious diseases of non-tropical origin is dismissed in the comparatively brief space of 31 pages while diseases of metabolism claim 54 pages of which no fewer than 37 are devoted to diabetes: 11 pages are taken up solely with diabetic diet lists and more or less complicated formulas are given for optimal dietary calculation and for estimating the ketogenic—anti-ketogenic balance. The section on dietetics in Part I, although eminently readable, appeared to the reviewer to be a little top-heavy for the rest of the volume. Of actual errors there are remarkably few but we do not like to see the familiar name of Wenyon masquerading as Menyon (page 58). No omissions of note were detected but some reference to the work of Mollgaard and his school on pulmonary tuberculosis might usefully have been included.

Dr. Clendinning's book can be warmly commended to the general practitioner for whose benefit it is obviously

designed: it tells not only what to do, but of even greater importance, how to do it. The photographs, skiagrams and other illustrations are good, and there is an adequate index together with brief references to the more important literature of the different sections. Printing and general get-up are in accordance with the best traditions of the well-known publishing house responsible for its production.

J. M. H.

THE DEVELOPMENT OF THE HUMAN EYE.—By Ida C. Mann, M.B., B.S. (Lond.), F.R.C.S. (Eng.), Assistant Surgeon, Royal London Ophthalmic (Moorsfields) Hospital, with a foreword by Sir J. Herbert Parsons. London: Cambridge University Press. Published for the British Journal of Ophthalmology, 1928. Pp. 306. Price, 36s.

MISS MANN'S book is one of the most important contributions to British ophthalmology of recent years and will take its place amongst the classical productions of the English school in this specialty. From the time of her earliest publications, it was evident that Miss Mann's work would rank with that of continental authors who had made a prolonged study of the subject. In the comparatively short time since then her observations have advanced our knowledge of the subject to a very considerable extent and rank as authoritative expressions of recent investigations in this field. The volume noted above places at the disposal of English readers not only material which was not heretofore available in English, but a compilation of Miss Mann's own work arranged and presented in a way which makes it comparatively easy for anyone to follow the march of events in the upbuilding of the human eye from its very beginning.

Chapters I and II deal with the formation of the primary optic vesicle and describe in general its development together with its associated mesoderm. Starting from a stage of embryonic life before ocular structures are recognisable, the development of the eye is rapidly traced to its condition at birth. In this survey some interesting points are brought out such as the inherent power of the optic vesicle to invaginate, and the converse with regard to the lens plate formation and its invagination. The latter is not an inherent power in any localised area of surface ectoderm, but occurs as a reaction on the part of the undifferentiated surface ectoderm to some stimulus from the invaginating vesicle. It has been shown in frog embryos that a primary optic vesicle transplanted to a site where it is not in contact with surface ectoderm will invaginate and if transplanted beneath the surface ectoderm in another part of the body, the ectoderm in contact will attempt to form a lens. The probable reason given for the formation of the foetal fissure is interesting. If invagination of the cup occurred symmetrically without the formation of a cleft, there would be no direct continuity between the inner retinal layer and the optic stalk so that nerve fibres developing in the inner side of the cup would have no direct path to the brain. The mechanism of the production of congenital abnormalities in general is briefly dealt with shorn of ambiguous phrases, and such conditions as anophthalmos and microphthalmos with cysts of cup and fissure explained. Elsewhere throughout the book different congenital defects are dealt with. These explanations will clear up many faulty impressions in this connection especially in regard to opacities of the lens and the colobomata of choroid and iris.

Chapter III deals with the detailed development of the lens and the information contained therein is indispensable to anyone who wishes fully to appreciate the advantages of the slit lamp.

Chapter IV on the neural ectoderm is a fascinating study in embryonic histology. It is divided into four sections. (a) Retina proper, (b) ciliary epithelium (pars plana and pars plicata), (c) iris, and (d) optic nerve. The astonishing development of the inner layer of the cup is described—the outer unicellular layer remaining simple right on into adult life except that it becomes pigmented. The layers at first separated by the cavity of the primary vesicle eventually come together,

but their relationship even in the adult is not very close; hence the ease of detachment of the retina (the inner layer). The progress of the growing margin of the cup into the plicated ciliary region with its pigment free but simple unicellular inner layer is traced, and the continuation forward and inward of the two layers as the posterior part of the iris (the deep layer of which eventually becomes pigmented) is dealt with in detail describing the interesting origin of the sphincter and dilator muscles from the neural ectoderm. It may be noted that the choriocapillaris only develops from mesoderm in contact with the pigment epithelium.

Chapter V forms instructive reading for those interested in the operative treatment of cataract, and the ætiology of primary glaucoma. The vitreous body proper is described developmentally in two stages. The primary vitreous consists of ectoderm fibrils originally uniting the lens vesicle and the inner neural ectodermic layer of the cup which has become invaded by and continuous with the mesodermal elements associated with the vasa hyaloida propria and the tunica vasculosa lentis posterior. With the atrophy of the vascular elements and the growth of the cup ectodermal fibres developing from the neural epiblast lining the cup proceed to fill the space till eventually the structure thus composed forms the main mass of what in the adult is the vitreous body. It is largely composed of ectodermal fibrils having continuity with the internal limiting surface of the retina and pars plana and has no bounding layer as such except that which constitutes the membrana limitans interna of the retina. The zonule is regarded as the tertiary vitreous. It is purely ectodermal in origin arising from the cells of the inner layer of the cup in the region anterior to the ora serrata. This chapter makes clear our ideas on such things as the retro-lental space, the vestigial remains of the hyaloid artery and the tunica vasculosa lentis as seen by the slit lamp, Cloquet's canal, Egger's line, the so-called hyaloid membrane; and explains why the vitreous detaches up to the ora serrata. To quote from the text "Thus we see that the adult vitreous is practically entirely derived from the neural ectoderm of the inner layer of the optic cup, only that portion lying immediately behind the lens and in the neighbourhood of the canal of Cloquet having in it any element derived from the surface ectoderm (lens) or mesoderm."

Chapter VI deals with the associated mesoderm and the advent of the foetal blood system including the development and retrogression of the foetal intra-ocular system, which has to do with the early nourishment of the primary vitreous and lens. The important part which the associated mesoderm plays in connection with the iris is fully described and many points in connection with the normal iris structure are rendered clearer thereby. The formation of the cornea, anterior chamber, ciliary muscles with the parts adjoining the angle and the sclera are detailed and an explanation for certain abnormalities such as buphthalmos and posterior staphyloma explained. The latter is associated with the lagging behind in the development of the sclera in its posterior portion and may be correlated with the greater stretching of this region in progressive myopia. It is of interest that the chromatophores of the choroid do not appear till about the 5th month.

Chapter VII deals with the orbit and its contents, and Chapter VIII briefly sets forth the phylogenetic development and morphology of the human eye. The book concludes with Chapter IX which is a synoptic comparison of ocular with general development in parallel column form. This is followed by an extensive bibliography and an index.

The book is profusely illustrated with original drawings by the author which are beautifully reproduced in keeping with the style of the whole work. There is a foreword by Sir John Herbert Parsons in which he points out that Miss Mann has been able to place on a sounder foundation, many debatable points by having studied them for the first time on human material. He states that "the author has placed all who are interested in the subject under an obligation by providing them with so exhaustive and well-authenticated a treatise."

R. E. W.

A TEXT-BOOK OF GENERAL BACTERIOLOGY.—By Edwin O. Jordan, Ph.D. Ninth Edition. London and Philadelphia: W. B. Saunders Company, Ltd., 1928. Pp. 778, fully illustrated. Price, 28s. net.

THIS is a standard book on bacteriology. That it is an extremely popular one is obvious from the fact that it has gone through nine editions since 1908 and that each edition has had to be reprinted at least once.

"General Bacteriology" is a misleading title as the book is essentially one on medical bacteriology; there are admittedly chapters on industrial bacteriology and the bacterial diseases of plants, but they are short chapters and would not, one imagines be of much value to students of these branches of the science.

The author is an American and appears to depend almost entirely on the American medical press for his information; fortunately, America is by no means backward in this subject so that the book does not suffer to any serious extent, but, nevertheless, it does suffer.

In the chapter on *Bacillus lepræ* (sic) two pages are devoted to the subject of cultivation of the organism and another to animal experiment; the work of Clegg, Duval and others is described and there is actually an illustration of a pure culture of *Bacillus lepræ*, but in these three pages there is no note of scepticism and no reference to the fact that many well-known and very conscientious workers have completely failed to confirm the observations of these workers, and that in the opinion of many bacteriologists the bacillus of leprosy has never been grown on artificial medium, nor has the disease been transmitted to animals.

The author states that the chapter on parasitic protozoa has been entirely re-written. As the reviewer has not a copy of the last edition of this book he cannot confirm this statement, but the chapter has certainly not been brought up-to-date.

The book is published in America; the printing, paper and binding are, therefore, excellent and in the very best style of this well-known firm of publishers.

L. E. N.

SYSTEMATIC INFECTIONS: THEIR DIAGNOSIS AND TREATMENT.—By A. K. Gordon, M.B., B.C., B.A. (Cantab.). London: Baillière, Tindall and Cox, 1928. Pp. x plus 176. Price, 10s. 6d. net.

THIS book is written with the object of showing the general practitioner how he can make use of the pathologist, more especially the bacteriologist.

There is no attempt to teach the practitioner to be an amateur bacteriologist; for technique—other than that of taking the specimens—he is referred to bacteriological hand-books. But he is shown how to interpret the laboratory findings.

The book appears to be well written and the subject is dealt with in a clear manner; nevertheless, we cannot help feeling that the contents *thereof* could be found in most modern text-books on medicine and that there it would be seen in truer perspective. The table in the appendix is, in the opinion of the reviewer—a bacteriologist—thoroughly immoral.

• One does not quite see what long-felt want (so dear to reviewers!) is supplied by this book, unless perhaps a suitable present from a pathologist to the medical practitioner in the neighbourhood.

The get-up of the book is satisfactory, but unattractive, and not in the very best style of this well-known firm of publishers.

L. E. N.

SOME PRINCIPLES OF DIAGNOSIS, PROGNOSIS AND TREATMENT.—By Robert Hutchison, M.D., F.R.C.P. Bristol: John Wright and Sons, Ltd., 1928. Pp. 54. Price, 2s. 6d. net.

ANYTHING from the pen of Dr. Robert Hutchison is always worth reading and this small volume is no exception. It contains nothing that we did not know before (as the author himself admits in his preface), but it does reveal how very infrequently we apply our much-vaunted commonsense, in every day medical practice. The rapid growth of the wholesale drug industry has tended to cause a decline in the art of elegant

prescribing. So it is also with our diagnostic faculty: the clinical sense is in danger of undergoing considerable atrophy in these days of excessive reverence to the presiding deities of the microscope, the incubator and the X-ray tube.

It is realised that we are probably in a distinct minority in disliking the expression "follow-up" departments on p. 22—that it defines exactly what the author means we admit, that the phrase is of trans-Atlantic origin weighs nothing with us, but we would rather not have seen it.

A most excellent little book.

J. M. H.

STERILITY IN WOMEN: DIAGNOSIS AND TREATMENT.—By Sidney Forsdike, M.D., B.Sc. (Lond.), F.R.C.S. (Eng. & Edin.). London: H. K. Lewis & Co., Ltd., 1928. Pp. viii plus 133, with 25 illustrations, including 17 plates. Price, 9s. net.

"Sterility in Women" by Forsdike is a very useful short book of 120 pages. Sterility is defined as a condition in which fertilisation does not take place, and not as the inability to produce a living child. The diagnosis of sterility in woman and man is fully dealt with in Chapter III, and the causes in woman are well done in Chapter IV. Not every gynaecologist, however, will agree that "retroversion without dyspareunia is rarely a cause of sterility." The author makes the interesting point that the tubes of a retroverted uterus may be apparently blocked at 300 m.m. and patent at 120 m.m. after replacement. Functional sterility is well discussed in two chapters, but we should like to point out that the statement "vaginismus is a true neurosis and is not dependent upon any local lesions of the vulva" is, in our opinion, incorrect and is incompatible with one that follows it almost immediately, i.e., "..... but where an organic lesion is present and remediable, the condition may be cured."

There is an excellent practical account of inflation of the tubes. Provis's modification of Currier's apparatus is recommended with a special forceps of the author for clamping the cervix around the uterine tube. The author prefers not to use an anæsthetic. Bonney's more simple apparatus is not even mentioned. The author not only supports Rubin's claim of 10 per cent. of pregnancies after inflation but claims 15 per cent.: he does not state, however, whether these followed after one inflation or after repeated inflation.

Investigation by lipiodol is well described and fairly discussed: his experience is that it has an even greater therapeutic effect than inflation. Several excellent hystero-grams are reproduced showing the various conditions that are met with.

Chapters XI and XII are devoted to treatment and contain much that is well considered, deliberate and judicious. Emphasis is rightly laid on the necessity of proving the husband to be beyond reproach before submitting the wife to treatment which may turn out to be useless and unnecessary. We cannot agree with the statement, made in connection with Gilliam's operation, that "the round ligaments are frequently so attenuated and frail that the operation cannot be done"; this is a condition we have never seen. Salpingostomy is given only a cautious and qualified approval in suitable cases; this is sound teaching.

The last chapter deals with therapeutics. Endocrine therapy (except with thyroid extract) is referred to in terms which must be very disappointing to the unreasoning enthusiasts of a few years ago.

There is a good bibliography at the end of each chapter. The book is excellently printed and can be confidently recommended alike to the general practitioner and to the specialist.

S. A. McS.

RADIUM IN GYNÆCOLOGY.—By J. G. Clark, M.D., C. C. Norris, M.D. and G. Failla, E.E., M.A., D.Sc. Philadelphia and London: J. B. Lippincott Company, 1927. Pp. 351, with 49 illustrations and 1 plate. Available from Messrs. Butterworth & Co. (India), Ltd., Calcutta. Price, Rs. 26-4 or (35s.).

This is one of the most readable and practical books on the subject which we have had the pleasure of

reading. After a short chapter on the history of the discovery of radium, and the development of treatment thereby, Mr. Failla gives us a very interesting discourse on the physics of radium and its relation to the constitution of matter, including problems dealing with the distribution of the element, filtration and certain biophysical considerations.

The third chapter deals with the pathology and action of radium, including its effect on various tissues, innocent and malignant neoplasms.

The remaining chapters deal with the symptoms, diagnosis and treatment of the various gynaecological conditions in which radium has been found of use.

In the final chapter on sterility and dysmenorrhœa a reference is made to the treatment of hypo-function of the ovaries by small doses of X-rays (according to Hirsch 15 per cent. of the castration dose to each ovary). The results in carefully selected cases are stated to be improvement in ovarian function as shown by the regulation of menstruation and the induction of pregnancy with birth of healthy children.

The book is profusely illustrated and the drawings illustrating the technique of intra-cervical and intra-uterine application of radium are particularly clear and helpful.

J. A. S.

A MANUAL OF PHYSICS, THEORETICAL AND PRACTICAL, FOR MEDICAL STUDENTS.—By Hugh C. H. Candy, B.A., B.Sc. (Lond.), F.I.C. Third and Enlarged Edition. London: Cassell and Company, Ltd., 1928. Pp. 488, with a colour frontispiece and 299 figures in the text. Price, 7s. 6d. net.

It is a handy volume covering all the branches of physics and meant for medical students. Part I is devoted to general physics, Part II to heat, Part III to sound, Part IV to light, Part V to electricity and magnetism, and Part VI to practical physics. Eleven tables of useful data have been appended. The standard of this book does not exactly correspond to that of any examination in this province (Bengal), but it will be found very useful by the students preparing for the Primary Licentiate Examination of the State Medical Faculty of Bengal, the syllabus of which it fully covers. But the standard falls far short of that of the Pr. Sc. M.B. of the Calcutta University.

The treatment is elementary from the standpoint of modern views, and as far as possible non-mathematical; the little knowledge of trigonometry that is required can be obtained from the first chapter of the book itself. The language is throughout lucid, the diagrams good and the examples at the end of each chapter have been well selected.

Several topics of advanced character which are not usually included in books of this size and standard have been introduced for example, kinetic theory, spherical aberration, double refraction, polarisation, saccharimetry, diffraction, Tyndall effect, etc. These are useful for medical students no doubt but the treatment of many of these subjects is so meagre that it will not be helpful to one who does not possess any previous knowledge of them.

The following are some of the defects that are evident in the book. Schematic diagrams are given for the aneroid barometer and Sixe's thermometer, but their pictures should have been added. No figure is given of finding the heat of combustion although the method explained; nor are there any diagrams given of Nicol's prism, the saccharimeter or d'Arsonval galvanometer. It is noticed also that the terms isotonic, hypertonic and hypotonic solutions have not been explained in connection with osmotic pressure and osmosis. The application of the method of integral calculus in finding the potential at the point due to a charged body is inconsistent with the rest of the book and could easily have been avoided, and a simpler proof given.

T. C. K.

STUDENTS' HANDBOOK OF OPERATIVE DENTISTRY.—By R. Ahmed, D.D.S. Calcutta: The Indian Dental Journal, 1928. Pp. II plus 418. Price, Rs. 20.

DR. AHMED has been very ambitious in attempting to put before his students notes on Dental Anatomy, Dental Histology, Dental Therapeutics, Operative Dental Surgery and Dental Electro-Therapeutics in one volume of 400 pages.

His task has been a very arduous one and he has not met with as much success as his efforts deserve.

According to the bibliography at the end of his book, he has consulted in all about 80 works. Dr. Ahmed would have been more successful, if he had consulted only the most recent work in each subject.

Yet there are a number of discrepancies and at the same time some subjects seem to have been dealt with more fully than one would expect in a book of this nature.

For example, while seventy pages are given to the description of the anatomy of the teeth, cavity preparation is dismissed in less than four pages.

There are many points to which one might take exception. It will suffice to quote one—from page 299 dealing with the technique of extraction of the upper central incisor.

"The operator should stand behind the patient, his left arm should be placed upon the head of the patient and with the palm of his hand the lips should be retracted and some of his fingers should support his jaws."

A stance behind the patient would not appear to be the best position for the operator in extracting any upper teeth, the orthodox position on the patient's right front being preferred, whilst the retraction of the lips by the palm of the hand seems almost impossible.

The book itself is well produced and well printed on good paper, but the price at Rs. 20 makes it rather costly from a student's point of view.

J. E. G.

AN INTRODUCTION TO THE TECHNIQUE OF SECTION-CUTTING, FROM THE NOTES OF THE LATE MR. PETER JAMIESON.—By Frances M. Ballantyne, M.A. Edinburgh: E. & S. Livingstone, 1928. Pp. xii plus 80, with 11 illustrations. Price, Rs. 2-4. Obtainable from Messrs. Butterworth & Co. (India), Ltd.

THIS is an excellent little book on technique compiled from the notes of the late Mr. Peter Jamieson of the Department of Zoology in the University of Glasgow.

In it are described briefly and clearly methods of preparing tissues, and of cutting sections by the paraffin and celloidin methods. Many points are described in connection with the various procedures and beginners, even in the tropics where special difficulties not mentioned in it are encountered, will find it a valuable guide.

G. S.

DEAFNESS AND ITS ALLEVIATION.—By Vincent Nesfield, F.R.C.S. (Eng.). London: H. K. Lewis & Co., Ltd., 1928. Pp. v plus 85, with 19 illustrations. Price, 7s. 6d. net.

THE operation that Mr. Vincent Nesfield now describes for the alleviation of chronic deafness does not give us the thrill of a novelty. It was advocated by Aristide Malherbe as many as 29 or 30 years ago, and then quickly was lost sight of until its present resuscitation. Briefly the operation is one in which a new communication is made from the outside through the mastoid cortex posterior to the tympanum to the antrum. It would appear that the special indication for the operation is Eustachian obstruction, but Mr. Nesfield has also performed it with success in cases of oto-sclerosis.

Mr. Nesfield has operated on over 300 cases. Of this vast number, the results of only 11 cases are given and one is left in complete ignorance of what happened to the remaining 289 patients. The results of these 11 cases are not in the least bit convincing as Mr. Nesfield has not given any definite clinical picture of the cases

before or after treatment, so that one does not know what the functional tests of hearing were before and after. He states that his best and almost miraculous results have been in 2 cases where deafness was of only 2 years standing.

Such statements as "Three months later, i.e., after operation, she could hear a tuning fork on the mastoid bone for ten seconds" and in another case "A year later she was able to hear her name when spoken to in the dark at 2 yards and went to a lip reading class and improved her apparent hearing very considerably" are given as proofs of the remarkable results of the operation. Mr. Nesfield's book might have served a very useful purpose, either to prove or disprove the utility of this operation, had he based his observations on more scientific lines, but as it is, we are unconvinced and remain completely in the dark.

N. J. J.

HANDBOOK OF DISEASES OF THE NOSE, THROAT AND EAR, FOR STUDENTS AND PRACTITIONERS.—By W. S. Syme, M.D., F.R.F.P. & S.G., F.R.S.E. Edinburgh: E. & S. Livingstone, 1927. Pp. 400, with 26 text illustrations and 21 coloured and X-ray plates. Obtainable from Butterworth & Co. (India), Ltd., Calcutta. Price, Rs. 9-6.

IN this small handbook of the Diseases of the Nose, Throat and Ear a very wide field has been covered, indeed so wide is the field and so small the book that of necessity the author has touched very briefly on most topics. The book, owing therefore to the very superficial treatment of the subject, is hardly one where information on difficult points is to be obtained. The aim of the book, however, is "to stimulate the interest of students in the specialty" and from this point of view, the book is an excellent introduction of the subject to a student just commencing his classes in the Diseases of the Nose, Throat and Ear Departments.

N. J. J.

DISEASES OF THE THROAT, NOSE AND EAR.—By Dan McKenzie, M.D., F.R.C.S.E. Second Edition. London: Wm. Heinemann (Medical Books), Ltd., 1927. Pp. 677, with 3 coloured plates and 254 figures in the text. Price, 45s. net. Agents: Thacker, Spink & Co., Calcutta.

SEVEN years have elapsed since the appearance of the first edition of this admirable work. The present edition is larger by nearly one-third and in it is given a clear and concise account of the diseases of the nose, throat and ear upon all points that come within the scope of this branch of surgery. The book, however, expresses the author's point of view and opinions, some of which may be challenged, and it does not attempt to be a book of reference which, for its size, it might well be. Nevertheless, it is the expression of a long experience and sound judgment, and for this reason it is to be commended. The book has been written mainly from the practical point of view and there are many excellent accounts dealing with the operative surgery of these parts.

Malignant disease and its treatment, surgical diathermy and endoscopy are all fully dealt with, and the book has been brought thoroughly up-to-date. One would not hesitate in recommending it as a first class text-book.

N. J. J.

PRACTICAL GUIDE TO DISEASES OF THE THROAT, NOSE AND EAR, FOR SENIOR STUDENTS AND JUNIOR PRACTITIONERS.—By William Lamb, M.D., C.M., M.R.C.P. (Lond.). Fifth Edition. Revised by F. W. Sydenham, M.D., C.M., F.R.C.S. (Edn.), D.P.H. (Vict.). London: Baillière, Tindall and Cox, 1927. Pp. xvi plus 450, with 31 plates and 78 figures in the text. Price, 12s. 6d. net.

THE fifth edition of Lamb's Practical Guide to the Diseases of the Throat, Nose and Ear, is an excellent little book on the subject. The aim of the author is to present to the student and practitioner a guide to

enable them to recognise the common abnormalities and to treat minor ailments. One may say without hesitation that the book does all that it has set out to do. The work has been written and revised by two gentlemen who had been in general practice for many years before setting out to specialise, and it, therefore, should be of special value to the general practitioner whose point of view is stressed. The book has been brought thoroughly up-to-date and is certainly to be recommended.

N. J. J.

ELEMENTARY BACTERIOLOGY.—By E. Joseph and E. O. Greaves. Philadelphia and London: W. B. Saunders Company, 1928. Pp. 506. Illustrated. Price, 15s. net.

This is another publication, and quite a good one, dealing with elementary bacteriology. It is, however, somewhat too comprehensive for under-graduates in medicine, and not full enough to serve as a work of reference.

Having sections dealing with the bacteriology of water-sewage, milk, milk products and other foods it may be a suitable text-book for students of bacteriology in courses of public health, but for under-graduates there are other and more satisfactory publications on the market.

G. S.

EXPOSURES OF LONG BONES AND OTHER SURGICAL METHODS.—By Arnold K. Henry, M.B., B.Ch., F.R.C.S.I. Bristol: John Wright and Sons, Ltd., 1927. Pp. xl plus 80, with 51 figures in the text. Price, 10s. 6d. net.

THE best methods for the exposure of long bones for dealing with ununited or malunited fractures or for removal of sequestra of any size in the shaft of a bone receive but scanty notice in text-books. When the earlier chapters of this book appeared in the *British Journal of Surgery* many surgeons who had been profoundly dissatisfied with the wholesale cutting of muscles and the cramped exposure afforded by the external lateral approach to the femur must have been grateful to Professor Henry for the neat and almost bloodless approach he described, applicable to any condition of the bone and especially to the cases of chronic osteomyelitis, so common in this country, with very large sequestra of the shaft surrounded by masses of sclerosed bone and having several sinuses in unpleasant proximity to the line of the femoral artery. Equally welcome was the method of exposing the whole shaft of the humerus without risk to the radial nerve and of the radius with the deep branch of the radial safely displaced with the supinator muscle. The lines of approach are lines of safety, simplicity, and speed with the minimum of anatomical disturbance and we welcome the re-publication of these papers in book form.

The remaining chapters deal with original methods worked out by the author in regions almost unexplored, the ligature of the first part of the left sub-clavian artery from behind, which suggested an ingenious modification of the ordinary aneurysm needle, the removal of the left cervico-dorsal sympathetic ganglion from behind, the ligature of the vertebral artery in its second stage, and some ingenious modifications of the transphenoidal approach to the pituitary are pioneer works whose value is certain to be appreciated and utilised by others, if not by the author himself.

W. L. H.

BAILLIERE'S SYNTHETIC ANATOMY.—By J. E. Cheesman. Part IX Pterygo-Maxillary Region. Enlarged from Part IX. London: Baillière, Tindall and Cox. Text 6, Plate 12. Price, 2s. 6d. net.

We welcome the successful production of those plates of the pterygo-maxillary region. The external maxillary, the lingual and the internal maxillary arteries with their branches in successive stages of the dissection have been more prominently displayed in these enlarged plates. An intricate part like the pterygo-maxillary region requires

a magnification for clear conception and the author has done well in publishing these enlarged plates of the region as a separate part. The remaining parts containing plates of the thorax, abdomen, inferior extremity and the perineum are in preparation. The index has been well arranged as in the previously published parts for easy reference. Students of anatomy will find these plates very useful and interesting in the leisure hours. It is suggested that the publishers should ascertain whether these plates will adhere together in a tropical climate if kept long. For in some of the old publications, adhesion between adjacent plates has been observed at the coloured areas.

N. P.

THE BASIS OF SENSATION.—By E. D. Adrian, M.D., F.R.C.P., F.R.S. London: Messrs. Christophers, 1928. Pp. 122, with 31 illustrations. Available from Messrs. Butterworth and Co. (India), Ltd., Calcutta. Price, Rs. 5-10.

As the author points out the title is an ambitious one and the student of metaphysics or psychology may be disappointed in finding a product of the physiological laboratory. The author is a distinguished physiologist, and the book is, in fact, an account of his brilliant researches during the last few years into the nature of the nervous impulse and its relations with internal stimuli, and with the central nervous system.

This work has been rendered possible by the use of a valve amplifier, similar to that used in wireless telegraphy. This has "made it possible to detect the smallest electric changes with relatively insensitive recording instruments."

By this means it was found possible to detect and record the action currents in sensory nerves, thus opening up an entirely new field for investigation.

In this way it has been shown that a stimulus to an end organ must reach a certain critical intensity in order to evoke sensory recognition. For instance, the impulses produced by a pain stimulus are of the usual type, and have the usual range of frequency, but the discharge must have a certain mass (duration and intensity), to evoke the pain reaction.

The sequence of events between the stimulus and the mind are finally shown in diagrammatic form. The stimulus is shown as appearing suddenly and remaining at a constant value. The excitatory process in the receptor declines gradually, and as it declines the intervals between the impulses in the sensory fibres become longer and longer. These impulses are integrated by some central process and the rise and decline of the resulting sensation follows that of the excitatory process in the receptor. The quality of the sensation pain, touch, temperature, etc., seems to depend on the path taken by the impulses.

The author recognises that he has not entirely filled the gap between stimulus and sensation; but, he has at any rate added one more step to the causeway, and paved the way for others, as well as showing how advances in one science can be made by utilizing discoveries in other sciences.

J. A. S.

THE RADIOGRAPHY OF THE CHEST. VOL. II.—By W. Overend, M.A., M.D. London: William Heinemann (Medical Books), Ltd., 1928. Pp. 196. Price, 21s. net.

THE author of this work—Dr. Walker Overend—died in 1926 when the volume was ready for publication and it has been seen through the press by his son, Dr. T. P. Overend.

The present volume is the logical successor to the first volume, which dealt almost entirely with pulmonary tuberculosis. It completes the work by giving an account of other lesions of the lungs, pleura, thymus and diaphragm, from a radiological point of view.

The general arrangement of the subject-matter is similar to that in the first volume. Normal appearances are first discussed and the various non-tuberculous conditions are taken up *seriatim*.

As in the original volume the author's conclusions are checked and brought into line with the data of physical examination. The author's dictum in the preface to the first volume that "the correct interpretation of pulmonary opacities may become a very difficult problem, and necessitate the exercise of expert clinical skill as well as a wide-radiological experience" is the coping-stone of the whole work.

These two volumes are in fact an indictment of the too-prevalent idea that diseases can be diagnosed by laboratory methods only to the exclusion of the old clinical examinations. It is well known in this connection that many cases diagnosed in the early days of X-rays as hilum or perihilar tuberculosis, have never shown any clinical signs of the disease and are well to-day after the lapse of years. The volumes under review deprecate this attitude and insist on the correlation of clinical and laboratory investigations. From this it follows that the individual with a knowledge of both sides of the question will be more valuable than the specialist.

This volume differs from the former in that the skiagrams are collected at the end of the book and one notable defect is the fact that the numbers given in the text do not always correspond with the numbers of the skiagrams.

J. A. S.

TROPICAL MIDWIFERY.—By Lieut.-Col. V. B. Green-Armytage, M.D., F.R.C.P., I.M.S. Calcutta and Simla: Thakor, Spink & Co., 1928. Pp. xvi plus 173. Price, Rs. 3-8.

Lieut.-Col. V. B. Green-Armytage, I.M.S., has so firmly established his reputation amongst the students of the Medical College, Calcutta, as a brilliant teacher that "Tropical Midwifery," which is the second edition of "Labour Room Clinics," is sure to be welcomed by them. It is a handy volume of 173 pages of octavo size. We think the old title is a more suitable one for the work, which is presented as a series of lectures and not as a treatise or handbook planned out on a settled scheme. As might be expected from the author, the teaching is entirely up-to-date and practical.

The penalty for being so convincing a teacher is the necessity for the most meticulous accuracy and it is for this reason that we drew attention to a few points which are open to criticism. "The De Lee low Caesarian Section" is described as being done by "a curved transverse incision" in the lower uterine segment. This is incorrect: De Lee is entirely opposed to the transverse incision (which is recommended by Munro Kerr above the bladder, and by Phaneuf after separating and pushing the bladder down), a smaller point is that the mortality of eclampsia treated by conservative methods in Bengal is estimated to be 15 per cent.; we wish it were only that. Few authorities will share either the author's enthusiasm for Luker's method of treating puerperal sepsis or his utter detestation of dried milk in any shape or form.

Whether one agrees or not with every detail, the lectures are so impressive, so stimulating and so convincing that one can congratulate his students on having so brilliant a teacher and one can strongly recommend the book to them and to the profession generally in India. It is excellently printed and published by Thacker, Spink and Co. at the very low price of Rs. 3-8.

S. A. McS.

SURGICAL "DONT'S" (AND "DO'S").—By C. Hamilton Whiteford, M.R.C.S., L.R.C.P. Second (Enlarged) Edition. London: Harrison & Sons, Ltd. Pp. 68. Price, 4s. net.

In the second edition of this little volume, the author has added five new articles to the original number of ten.

The book is composed of a series of remarks, some of which are elaborated. Most of them are sound common sense and can be described as practical, every-day tips. They should be read, marked, learned and inwardly digested by all young surgeons and some older ones.

H. E. M.

RECENT ADVANCES IN SURGERY.—By W. Heneage Ogilvie, M.A., M.D., M.Ch. (Oxon.), F.R.C.S. (Eng.). London: J. & A. Churchill, 1928. Pp. 481, with 108 illustrations. Price, 15s. net.

This little volume put together by Mr. W. H. Ogilvie with the assistance of five collaborators covers a very great deal of the ground opened up by recent experimental work in surgery. Consequently there is nothing in the book which can be called new, as most of the work which has been discussed and brought into prominence by the author has already appeared in the medical periodicals.

Of particular merit is the chapter on the abdomen, especially where it deals with the surgery of the stomach which has been described in detail. The modern methods of the treatment of cancer have been fully gone into, and the author strongly recommends the use of radium in front of all other non-operative measures.

Plastic surgery is reviewed in a carefully considered chapter in which the writer describes a new Thiirsch graft-cutting knife devised by a Dublin surgeon, which he states promises to revolutionise graft-cutting.

In the section on venereal disease we are surprised to note that while syphilis is discussed in full, gonorrhoea is dismissed in one page, and no mention whatever is made of its treatment. The statement that stovarsol 1 gr. daily for 6 days has been advocated as a prophylactic for syphilis is interesting.

We have no hesitation in stating that this book which shows that the author has made an exhaustive study of modern literature, is well compiled, and is a valuable addition to the "Recent Advances" series.

H. E. M.

AIDS TO ORGANIC CHEMISTRY.—By Stanley F. Smith, with an Introduction by Professor R. H. A. Pilmor. London: Baillière, Tindall and Cox, 1928. Pp. 114. Price, 3s. net.

It is a small volume containing a collection of notes and formulæ useful as a guide to the grasping of the fundamentals of organic chemistry. The printing and get-up are good. The formulæ and notes will supply the student with a summary of the most useful information suitable for making a rapid review of the subject.

S. G.

A MANUAL OF SURGICAL ANATOMY.—By Charles R. Whittaker, F.R.C.S. (Edn.), F.R.S.E. Fourth Edition. Revised and Enlarged, Edinburgh: E. & S. Livingstone, 1928. Pp. xii plus 471, with 116 illustrations. Price, Rs. 11-4. Obtainable from Messrs. Butterworth & Co. (India), Ltd.

This new edition of Whittaker's surgical anatomy is sub-divided into six sections dealing respectively with the head and neck, the superior extremity, the thorax, the abdomen, the inferior extremity and the spine. In this edition, the number of illustrations has been increased and several radiograms have been incorporated to the advantage of the reader. Much information has been presented in a tabulated form and these tables will be of much help for quick reference. In the tables of the muscles, their origins, insertions, and nerve supplies have been given. In the tables of the blood vessels, their branches have been enumerated. In the tables of the lymph nodes, their situations, drainage areas and terminations have been beautifully arranged. The table of the nerves, besides giving their origin, contains the branches classified according to distribution as sensory, motor or articular. The anatomical facts required for application to surgery, have been concisely and lucidly dealt with. The illustrations both coloured and uncoloured are very instructive and the radiograms have added to the attractiveness of the book. Every student of medicine and every practitioner will find it very useful and interesting reading.

N. P.

MANUAL OF ORGANIC CHEMISTRY FOR MEDICAL STUDENTS.—By S. Ghosh, D.Sc., F.R.S. (Edin.) and Lieut.-Col. T. C. Boyd, F.R.C.S.I., D.P.H., F.I.C., I.M.S. Calcutta: Scientific Publishing Co., 1928. Pp. 263. Price, Rs. 4-8 or 7s. 6d.

THIS is a manual in which is embodied the result of the authors' long experience of teaching as professors of chemistry in the two premier medical institutions in India. It is not a small task to compile within a small compass all the subject-matter pertinent to the needs of a medical student. An ordinary manual of organic chemistry, which is usually thought sufficient as a general course of study for the B.Sc. degree, hardly satisfies the requirements of a medical student. In it, there is a good deal of superfluous matter which only serves to burden his memory with unnecessary details to the detriment of his learning things which are really important from the point of view of medicine. The main object of compiling an organic chemistry for medical students is to emphasise the importance of those organic compounds that are being used in medicine. The authors have acquitted themselves of the task very admirably, showing stage by stage as we glide along chapter after chapter, the formation of various groups of organic compounds.

They could not, however, help making this somewhat of a synoptical nature in order to suit the particular requirement of the student. They are fully alive to the fact that medical students who have got to go through so many subjects besides chemistry will detest a bigger text-book and prefer one of this kind. It is, however, neither too concise at the expense of clarity of expression nor at the sacrifice of the subject-matter as is the case with other existing books of this nature. Many notable improvements have been made upon the latter by deleting obsolete terms like "amylons" for "starch" and giving Werner's formula for urea—to quote a few examples. The chapters have been arranged quite in their proper sequence except the one on halogen derivatives of hydro-carbon, which might have been placed after the chapter on "aldehydes" inasmuch as chloroform is derived from chloral which is an aldehyde. In the chapter on proteins, the classification and definition may be left out altogether for a bigger text-book. A few typographical mistakes have crept in which, no doubt, will be corrected in future editions. The book is very well got up and its price is by no means high. It can strongly be recommended as a text-book of organic chemistry for students appearing in the 1st M.B. examination of an Indian University.

R. B. K.

AIDS TO PUBLIC HEALTH.—By W. G. A. Robertson, M.D., D.Sc., F.R.C.P.E. Second Edition. London: Baillière, Tindall and Cox, 1928. Pp. vi plus 186. Price, 3s. 6d. net.

THIS is the second revised and extended edition of this small book, the aim and object of which as the author says is mainly to help students preparing for examination in public health in order that they may "refresh their memory." The author does not and cannot claim that this small book can serve the purpose of a recognised text-book on public health which has become recently a very important subject. The whole of this subject is treated in 15 chapters in a small book of 186 pages. It is true that whole chapters are devoted to such subjects as "Meteorology," "Vital Statistics," "Sanitary Law and Sanitary Administration," "School Hygiene," "Industrial Hygiene," "Maternity and Child Welfare," yet the information given is so incomplete that a student going up for his examination in the Diploma in Public Health can hardly expect to go through his examination or satisfy his examiners with the scanty knowledge obtained from this little book. For an Indian student going in for the D.P.H. Examination of an Indian University, the information given is still less complete. Mere headlines are given in every chapter without explaining the important details. The book may be of some help in the subject of hygiene to those students who are preparing themselves for a degree or a licence in medicine and surgery—i.e., a general medical qualification, but it would hardly help a D.P.H. student.

R. B. K.

AIDS TO EMBRYOLOGY.—By Richard H. Hunter, M.D., M.Ch. London: Baillière, Tindall and Cox, 1928. Pp. 160, with 30 figures. Price, 3s. 6d. net.

THIS little book of the "Aids" series consists of 12 chapters dealing with: (1) the sex cells; (2) the germ layers; (3) the foetal membranes; (4) differentiation and law of recapitulation; (5) the skin and its accessory glands; (6) the nervous system; (7) the development of the eye and the ear; (8) the alimentary canal and its associated glands; (9) the circulatory system; (10) the coelomic cavities; (11) the urogenital system, and (12) the muscular and skeletal systems. The author has given in a short space the important facts with regard to the development of the human embryo and foetus. While quoting conflicting views with arguments for and against, the author has given his own views which appear more reasonable to him. The abnormalities of development which are commonly met with in the dissecting hall and the wards of the hospital have been suitably placed at the end of a chapter and will be extremely useful to students of medicine. Similarly, the summary of the development of the systems has been given at the end of each chapter and this will be of immense help to students revising their studies before an examination. The pharyngeal arches have been nicely tabulated for easy reference. The book does not pretend to replace big books on embryology, but it is an excellent aid for quick revision of the whole subject before an examination.

The book is strongly recommended to every student of medicine who will find it useful reading. There are a few typographical errors which we hope will be rectified in the next edition.

N. P.

QUARTERLY JOURNAL OF PHARMACY AND ALLIED SCIENCES.—Vol. I. No. 1 Jan.-March. London: Pharmaceutical Press, 1928.

WE have received a copy of the first issue of this journal which is being published by the Pharmaceutical Society of Great Britain, who also publish the Pharmaceutical Journal, the British Pharmaceutical Codex and Pharmaceutical Pocket Book. Besides a number of original articles of interest to the pharmacist, this number of the journal contains a résumé of a large number of papers dealing with the allied sciences of chemistry, pharmacognosy, pharmacy, pharmacology and therapeutics, bacteriology, clinical tests and new remedies. The names of the members of the editorial committee are sufficient to convince any one that the journal will not only be a great boon to the pharmacist, but will also be of considerable interest to the medical profession.

R. N. C.

Annual Report.

ANNUAL STATISTICAL RETURNS AND SHORT NOTES ON VACCINATION IN BENGAL FOR THE YEAR 1926-27. BY DR. C. A. BENTLEY, M.B., D.P.H., D.T.M. & H., DIRECTOR OF PUBLIC HEALTH, BENGAL. CALCUTTA, BENGAL SECRETARIAT BOOK DEPOT. PRICE, Rs. 1-3-0.

DR. BENTLEY's annual reports are always characterised by being more readable and more interesting than most, for although they include the usual dry statistics, he gives illustrative and informative maps and graphs, and forcible comments on the matter at issue from the point of view of an enthusiast in the sphere of public health. And the present report well illustrates this.

The most important change of the year was that the entire provincial vaccination establishment (with the exception of that in Darjeeling) was handed over to the district boards, in accordance with the official policy of expansion of local self-government. The Local Government have agreed to meet the salaries of an Inspector and a Sub-Inspector. When the scheme for a rural

public health organisation is in full operation, however, separate inspectors of vaccination will not be necessary, for inspection of vaccinations will become part of the general duties of the rural health officers and sanitary inspectors.

During the year a total of 3,278,581 vaccinations was carried out, an increase of 8.2 per cent. on the previous year's figures. Primary vaccinations decreased by 0.53 per cent., whilst re-vaccinations increased 20.1 per cent., owing to the general prevalence of small-pox. As the result of epidemic small-pox the number of vaccinations increased considerably in some districts, notably Pabna, Murshidabad, and Birbhum. On the other hand several districts showed a marked falling off; this is attributed in the Burdwan district to the large number of vaccinations during the two previous years when small-pox was unusually prevalent, and also to the diversion of vaccinators to anti-cholera duty; in Chittagong to the same reasons; and in Darjeeling to the absence of epidemic small-pox and a recent thorough-going vaccination campaign on the tea gardens. In Howrah, however, conditions were very unsatisfactory; Howrah is closely adjacent to Calcutta city, where small-pox was markedly epidemic, yet there was a marked falling off in the number of vaccinations performed. (Howrah, in fact, appears to tend to go Bolshevik in public health as well as in political matters.) In the *mofussil* municipalities also there appears to be a steady falling off.

Agencies outside the official one carried out 96,867 vaccinations during the year. The state of vaccination among the labour force of the Darjeeling tea gardens is reported to be satisfactory, but in the Dnars conditions are quite unsatisfactory—only 1,580 vaccinations were carried out among this very large labour force during the year.

There was a decrease of 13.3 per cent. in the vaccinations of infants as compared with the previous year's figures. In some districts, such as Malda, Rajshahi and Darjeeling, over 500 per mille of infants are protected; in 7 districts the proportion was between 300 and 400; in 8 others between 200 and 300; in 7 others between 100 and 200; whilst in 2 districts it fell as low as 77 and 33 per mille (Bogra and Bakarganj, respectively). The last two figures in reality mean a population almost entirely unprotected against small-pox. Six-puncture vaccination is proving increasingly unpopular.

The total cost of the department during the year was Rs. 4,52,819, of which sum Rs. 1,64,841 came from provincial revenues, Rs. 1,69,685 from district funds, and Rs. 1,18,293 from municipal funds. The expenditure in Calcutta on vaccination rose considerably, and Government again repeated its annual contribution of Rs. 50,000 to assist in the provision of free vaccination. The average cost per successful vaccination was 2 annas 11 pies.

A very instructive diagram given on page 8 shows (a) the death-rate from small-pox, and (b) the state of vaccination of the public in each district of the Province during the year. A study of the diagram shows that in only two districts—Burdwan and Darjeeling—is more than half the population protected by vaccination. This diagram is one of the most instructive ones in public health we have ever seen, for it visualises the facts. In Calcutta, for instance, it is seen that the mortality from small-pox—1.32 per mille—is beginning to creep up towards the total number protected—48.67 per mille. The difference may seem enormous, but a continuance of a *laissez faire* attitude on the part of the people may tend to make the figures equal.

Deaths from small-pox during the year numbered 31,936 as against 18,618 in the previous year. The quinquennial outbreak, which started in December, 1924, continued throughout 1925 and 1926, and exerted its heaviest toll in the period November 1926 to May 1927. The disease was prevalent in almost all districts. Extra vaccination staff was provided in the districts where the epidemic was severe.

Glycerinated lymph was in use, and the success rate is reported to be 92.8 per cent. for primary vaccinations, and 24.7 for re-vaccinations. Dr. Bentley comments

severely on the slackness of district health officers in inspecting vaccination. In Midnapur, where the epidemic was very severe, the district health officer spent only 47 days on tour; in Birbhum the district health officer inspected only 721 persons; and the health officer of Nadia was only on tour for 3 days and inspected 96 persons. "It is regretted that some of the district health officers have not yet sufficiently realised their heavy responsibilities..... Vigilant and careful inspection is necessary to give an impetus to the staff..... Personal control is demanded to prevent unreliable figures being returned, only to give a false sense of security." The district inspecting staff inspected 24.5 per cent. of primary vaccinations, and 11.3 per cent. of re-vaccination.

The total output of lymph from the Bengal Vaccine Depot at Entally was 2,680,464 doses and, as this was insufficient to meet the demand, extra lymph had to be purchased from Bihar and Orissa. The calf supply is the chief difficulty at Entally, but, with the discovery by Dr. Blaxall of the Government Lymph Establishment, London, that lymph can be kept without losing its potency for long periods if stored at 10°F., it should become possible to build up a reserve in cold storage for use in times of epidemics. The appointment of the English Vaccination Committee by the Ministry of Health in Great Britain in February, 1926, is an event which should do much to improve methods of vaccination in India, when their report is published.

Dr. Bentley's final summary is so important that we take the liberty of presenting it in *extenso*.

Summary.—From the facts stated in the preceding paragraphs, some broad and simple conclusions may be drawn. It is quite clear that the incidence of small-pox has shown a notable increase in Bengal since the year 1921, and there appears to be no evidence that the zenith of the present recrudescence has been reached. I must again draw attention to the grave risks incurred in respect of small-pox as a result of the large proportion of the population which is not vaccinated. Statistics indicate quite clearly the falling percentage of primary vaccinations to births. In view of the apprehended pandemic of small-pox forecasted as likely to occur in or about the year 1930, it becomes incumbent on all local authorities to put forth all their efforts in preparing the population to meet it whenever it comes. This preparation should consist in wholesale vaccination and re-vaccination of the whole population.

The protection which vaccination and re-vaccination affords cannot be disputed by anyone who has had actual experience in dealing with small-pox. The long experience of the country has taught us:—

(a) That, beyond all question, the mortality from small-pox is much less now than in pre-vaccination times.

(b) That the greatest diminution in the small-pox mortality is found in the early years of life, in which there is most vaccination.

(c) That in countries in which there is adequate vaccination and re-vaccination relatively to the population, there is little small-pox.

(d) That in houses invaded by small-pox in the course of an outbreak, not nearly so many of the inmates are attacked as of the unvaccinated in proportion to their numbers.

(e) That the fatality rate among persons attacked by small-pox is much greater, age for age, among the unvaccinated than among the vaccinated.

(f) That the degree of protection conferred by vaccination corresponds to the quality of the vaccine and to the thoroughness with which the operation of vaccination has been performed.

(g) That the protection afforded by vaccination wanes with the lapse of time.

(h) That improved sanitation, however beneficial in itself, cannot account for these facts; and

(i) That though early diagnosis, prompt isolation of small-pox patients in suitable hospitals, effective disinfection, supervision of "contacts" and other such public health methods are invaluable, they are no substitute for vaccination.

Insufficiency and inefficiency of vaccinators, coupled with inadequacy of pay, should be remedied without further delay. No evasion of the statutory rules for the qualifications of public vaccinators should be allowed, and their prescribed duties should be strictly enforced. For this reason, a living wage must be ensured before good work, satisfactory both in quality and in quantity, can be reasonably expected from the vaccinators. The local funds, set free by the Local Government's provision of a complete public health organisation, should be utilised in employing an adequate number of qualified vaccinators of the right stamp, to whom adequate remuneration should be offered. The Health Officers, Assistant Health Officers, Sanitary Inspectors and Vaccination Inspectors should keep a close watch over the vaccination condition of their jurisdiction and exercise a strict supervision over the Health Assistants and public vaccinators' work. Those District Boards and Municipalities which still employ only season vaccinators should abandon this false economy, which costs so much in human lives, and begin at once to keep all the year round, wholtime Health Assistants, who are qualified public vaccinators and whose services will be available in the other lines of public health work also.

In conclusion, I should like to place on record the valuable advice and assistance always rendered me by Dr. M. K. Chakravarti, M.B., the veteran Superintendent of the Bengal Vaccine Depot.

Correspondence.

FUNGUS INFECTIONS OF THE HANDS AND FEET.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the *British Medical Journal* of May 19th last, Dr. Rupert Hallam published an article entitled "Fungus infections of the hands and feet."

All of us practising in tropical climates have seen cases of skin infection between the toes, usually the fourth and fifth. Many of these are exceedingly difficult to cure and are apt to recur every hot weather. Cases of *dhobi* itch also do not often begin in the cold weather. Since reading Dr. Hallam's article, I have seen three intractable cases of this interdigital infection. On investigation, two of these were found to be suffering from *Tinea cruris*, although the fact was not mentioned by the patient. Both these cleared up under treatment directed to the parasite.—Yours, etc.,

C. NEWTON-DAVY,
Staff Surgeon.

BANGALORE,

18th August, 1928.

RODENT ULCER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—In the October 1927 issue of your journal, my article on "A rodent ulcer cured by injections of Selenium" was published. The patient has come back as his rodent ulcer has broken down again. I have repeated ten injections of selenium this time but the improvement, if any, is very slight. I am now giving him X-ray treatment and if it fails, I shall perform the usual surgical operation.—Yours, etc.,

R. P. GHOSH,

CAPTAIN, M.B.,

Teacher, Medical School, Darbhanga.

LAHERIASARAI,

16th September, 1928.

Service Notes.

APPOINTMENTS.

LIEUT.-COLONEL N. M. Wilson, O.B.E., I.M.S., Civil Surgeon, Simla West, is appointed to hold charge of the duties of the Civil Surgeon, Simla East, in addition to his own, during the absence on leave of Major H. K. Rowntree, M.C., I.M.S.

Government notification regarding posting of Lieut.-Colonel W. Lapsley, I.M.S., as Civil Surgeon, Meerut, is hereby cancelled.

Major H. E. Murray, M.B., I.M.S., First Resident Surgeon, Presidency General Hospital, Calcutta, acted as Surgeon Superintendent of the Hospital, *vice* Major Kirwan, from the 26th April to the 31st May 1928.

Major H. E. Murray, M.B., I.M.S., First Resident Surgeon, Presidency General Hospital, Calcutta, is appointed to act, until further orders, as Surgeon Superintendent of the Hospital, in addition to his duties, *vice* Major Kirwan, with effect from the 1st June, 1928. This cancels notification No. 100T.-Medl., dated the 30th April 1928.

On return from leave, Major E. H. V. Hodge, M.D., I.M.S., was on general duty at the Medical College Hospitals for the period from the 22nd to the 29th April 1928.

Major T. L. Bomford, M.D., I.M.S., Civil Surgeon, Darjeeling, acted as Surgeon to His Excellency the Governor of Bengal, in addition to his own duties, from 21st May to 29th June 1928, *vice* Major H. Hingston, I.M.S., granted leave.

Captain T. H. Thomas, I.M.S., Second Resident Surgeon, Presidency General Hospital, Calcutta, acted as First Resident Surgeon of that institution in addition to his own duties, *vice* Major H. E. Murray, I.M.S., from the 26th April to the 31st May 1928.

LEAVE.

Lieut.-Colonel J. F. Boyd, I.M.S., Civil Surgeon, has been granted, by the High Commissioner for India, leave on half average pay for three months in extension of the three months' leave.

Major R. F. D. MacGregor, M.C., I.M.S., an Agency Surgeon, is granted leave on average pay for 8 months combined with leave on half average pay for 4 months under the Fundamental Rules, with effect from the 30th August 1928.

Major H. K. Rowntree, M.C., I.M.S., Civil Surgeon, Simla East, is granted leave on average pay for three months and ten days, with effect from the 3rd December 1928.

RETIREMENTS.

Lieut.-Colonel T. Hunter, C.I.E., M.D., I.M.S., dated 18th August 1928.

Lieut.-Colonel J. H. Murray, C.I.E., M.D., I.M.S., dated 24th March 1928.

NOTES.

PERNICIOUS ANÆMIA AND ITS TREATMENT WITH LIVER EXTRACT B.D.H.

THE treatment of pernicious anæmia by adding liver to the diet of the patient was first introduced by Minot and Murphy in 1926, and has since been widely adopted. In those cases in which the patient is able to tolerate the liver diet, very encouraging results follow its administration.

The treatment has drawbacks, however, not the least of which is the fact that many patients cannot tolerate a daily ration of half a pound of liver—the smallest quantity recommended to produce optimum results.

There is also the danger of over-cooking in the attempt to make the liver more palatable, with the possible destruction of much of its therapeutic activity.

The production on a manufacturing scale of a highly-active powdered liver extract, containing in small bulk the therapeutic principle of the original fresh liver, is of the greatest importance. This concentrated, potent extract is known as Liver Extract B.D.H.

Liver Extract B.D.H. is manufactured in the Chemical Works of The British Drug Houses Limited by a process, adapted from the observations of Cohn and others, which has been tested clinically and found efficient by the Medical Research Council.

Clinical Trials.

The clinical trials made in various hospitals upon samples of liver extract distributed by the Medical Research Council were reported upon briefly in the *British Medical Journal* and the *Lancet* of 10th March, 1928. In these trials the extract was gauged by the rate of increase of the young red cells (reticulocytes). In practice it was found that simultaneously with this increase there was a distinct feeling of general improvement in the patient, and this was followed by a progressive increase in the count of red blood corpuscles.

Of the thirty-four cases treated, thirty-two responded to the treatment, but nine of these were ruled out owing to complications such as a possibility of natural remissions and the influence of some previous treatment.

In thirty-three cases the improvement could be attributed with certainty to one cause only—the administration of the liver extract.

The daily dose given was the equivalent of half a pound of fresh liver. The rise in the percentage of reticulocytes reached a maximum in 12 to 15 days, whilst the count of the red blood corpuscles rose from 750,000 at the beginning of the treatment to 5,000,000 after 34 days' treatment.

Larger doses gave a quicker response, but the "half pound" daily dose is recommended as the most satisfactory.

In addition to the work carried out by the Medical Research Council, clinical experiments have been made with whole liver and with liver extract by Fraser and others. These workers reported their results in the *British Medical Journal* of 7th February, summarising their results as follows:—

"Nineteen patients with pernicious anæmia have been treated with whole liver or a liver extract. Nine of them were in the first attack or in a relapse, and seven of these showed a prompt response to treatment, with a temporary rise in the percentage of reticulated red cells in the circulating blood, and a steady increase in the total red cells and the hemoglobin. The reason for the failure of the treatment in the other two patients is not clear.

Ten patients commenced treatment during the remission stage or received other forms of treatment in addition, so that observations on the immediate effects of the treatment were not possible. The condition of these patients at the end of varying periods of treatment (up to six months) affords confirmatory evidence of the value of this treatment."

Further, the clinical evidence furnished by Minot and Murphy in their more recent experiments with a non-protein liver extract prepared by the method of Cohn confirms the evidence that liver extract is just as efficacious as whole liver.

In pointing out the advantages as to simplification of treatment in using the extract, these workers direct attention to the necessity of prescribing an adequate well-balanced diet during the course of the treatment.

Thus liver extract B.D.H., made in accordance with the method tested by the Medical Research Council and administered in conjunction with a full and well-balanced diet, will produce results in pernicious anæmia as beneficial as those obtained with a diet of whole liver.

Method of Administration.

Liver extract B.D.H. is administered orally. It is best given in hot water in the same way as meat extract with condiments to suit the individual palate; in this way it is quite palatable. As far as is known there are no conditions in which liver extract B.D.H. is contra-indicated.

How Liver Extract B.D.H. is issued.

Liver extract B.D.H. is issued in glass tubes each containing one daily dose, the equivalent of half a pound of fresh raw liver, and the tubes are supplied in boxes of three and of six.

References.

- Report of Medical Research Council: *British Medical Journal*, 10th March, 1928, p. 398. *Lancet*, 10th March, 1928, p. 514.
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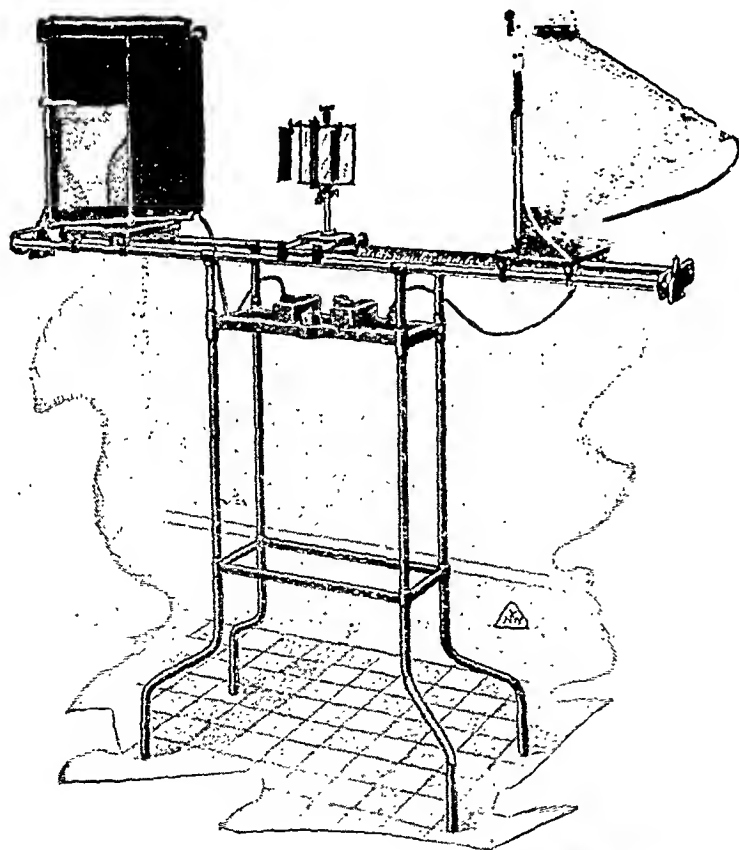
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Original Articles.

A REPORT ON THE INVESTIGATION INTO THE ÆTIOLOGY AND PREVENTION OF NAGA SORE IN ASSAM.

By D. N. ROY, M.B., D.T.M. (Cal.),

Assistant Professor of Medical Entomology in the Calcutta School of Tropical Medicine.

INTRODUCTION.

AN enquiry into the ætiology, cause and prevention of ulcers in the tea gardens of Assam was undertaken at the request of the Indian Tea Association. This lasted for only two months from 25th May to 23rd July of last year.

Reasons for Undertaking a Research on Naga Sore.—These ulcers appear in a sporadic, an

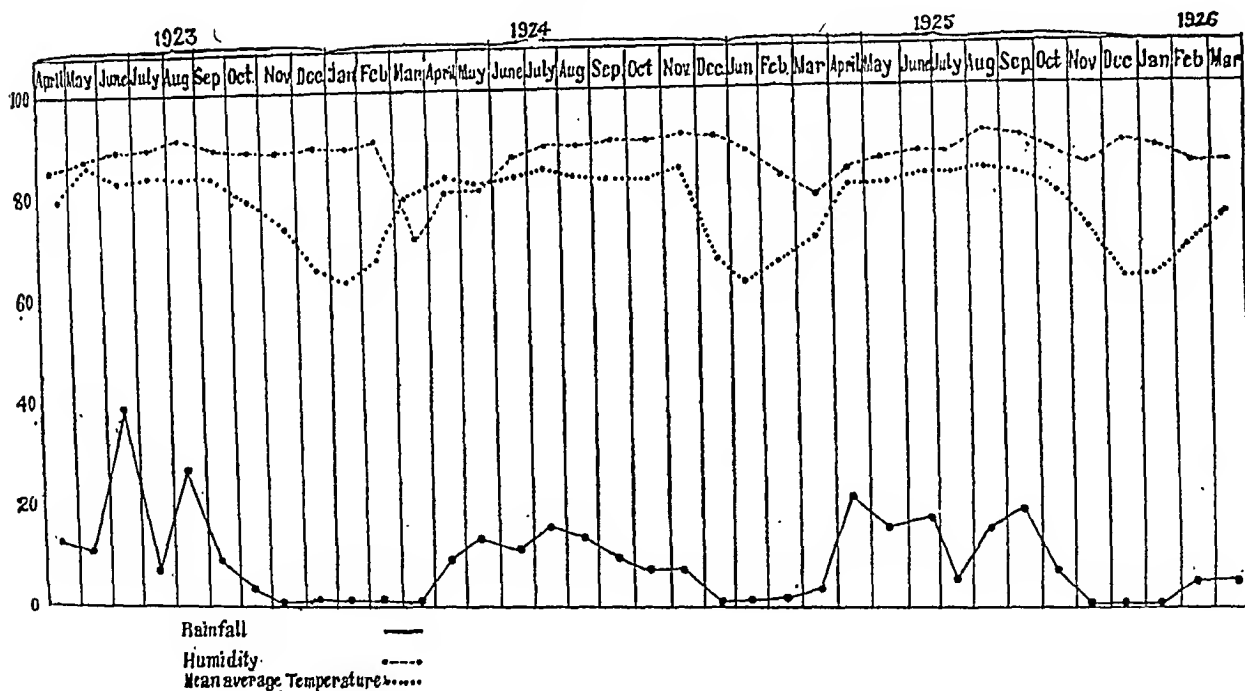
May, June and July and a portion of August. Apart from this question of pecuniary loss, the loss of an average of 41.4 days of labour among 50 coolies in a single garden is a thing which needs serious consideration.

Comparative tables have been given at the end to show the loss of labour which the company suffered during 1923-24, 24-25, 25-26 among 17 gardens under one estate in South Sylhet. The cases have been placed under one heading as ulcers and Naga sores, for, as will be mentioned later on, they are clinically indistinguishable.

I made my observations in South Sylhet in Balliserra Valley tea estates and in Cachar in Tarapore tea estates.

Climate, Rainfall and Humidity.—The rainfall is everywhere abundant during the monsoon months. These heavy rains moderate the summer heat, and make the places warm and damp. The variations between the three have been shown in Appendix A and B.

APPENDIX A.



the idea as the time at my disposal was very short. In Cachar, the disease was found to be as prevalent as in Sylhet.

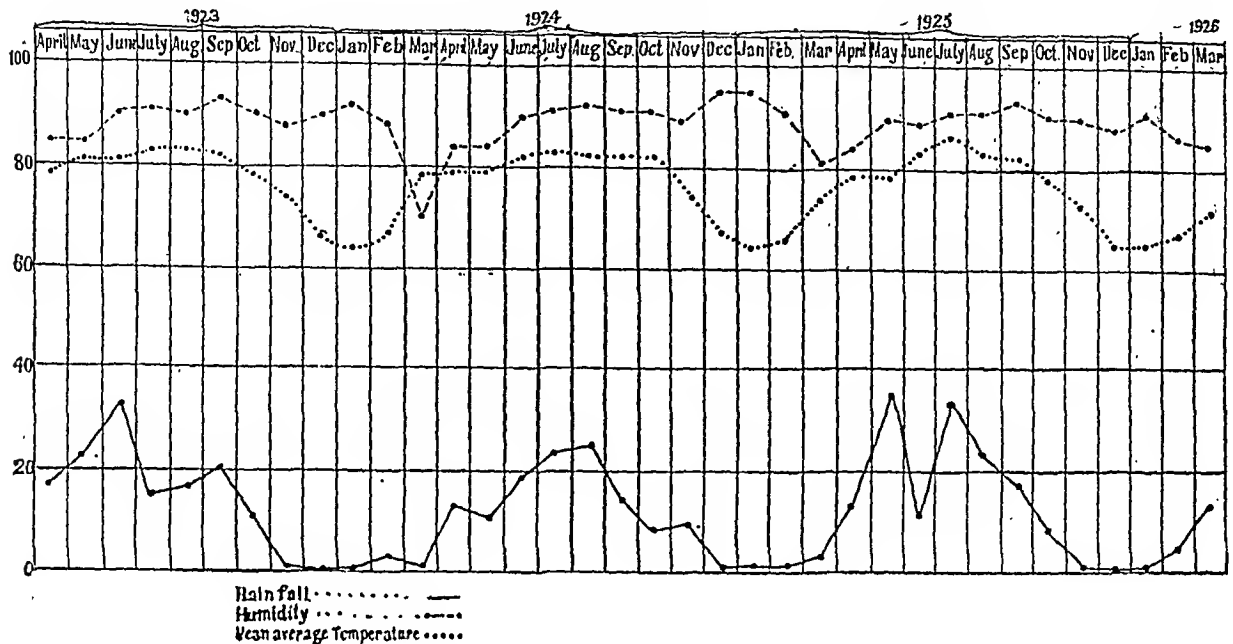
Reports from Upper Assam showed that the disease, though not evenly distributed, was fairly common there.

chemical manures, poisonous herbs, caterpillar stings, etc.

(iii) Scabies.

The writer selected 386 ulcers that were found on 210 patients in Cachar and in Sylhet as those which seemed to him clinically to be typical cases

APPENDIX B.



Synonyms.—Various names have been given to these ulcers according to where they are seen; thus in India they are known as Cachar sore, Naga sore, Frontier sore, Jungle ulcer or Jungli ghao.

Predisposing Causes.—In Assam the following have been observed to be predisposing factors in the causation of the disease:—

(i) Trauma—injuries, cuts, abrasions, wasp bite, cat bite, leech bite, etc.

(ii) Dermatitis of the skin from bonemeal,

of Naga sore, and their contributory factors when analysed showed:—

Trauma from various causes	..	45.3	per cent.
Leech bites	..	3.6	"
Itching from various causes	..	34.4	"
Papules	..	7.5	"
Water sore (ankylostoma)	..	0.2	"
Abscesses and boils	..	3.1	"
Scabies	..	2.8	"
Old ulcers broken down and probably tuberculous	..	1.0	"
Tuberculous ulcers as diagnosed clinically	..	0.8	"

APPENDIX C.

Return of Total Ulcer Cases for 1924-1925 on Some Tea Estates in the Luskorpore Valley. (Figures kindly supplied by Dr. R. Murphy.)

	Amo.	Rema.	Surma.	Luskorpore.	Nalua.	Chundeecherra.	Sat-churie.	Deundi.	Chand-pore.	Lal-chand.	Kaphai.	TOTAL.
January ..	46	27	8	5	3	11	3	0	8	3	3	117
February ..	41	50	4	8	4	8	2	2	8	3	8	138
March ..	41	73	4	11	2	11	2	6	8	3	4	165
April ..	36	67	4	9	10	10	11	8	6	7	8	176
May ..	80	87	9	18	12	13	16	24	22	11	19	311
June ..	152	127	34	67	26	25	65	50	82	21	72	721
July ..	120	111	37	66	18	23	36	72	63	34	74	654
August ..	107	96	36	45	23	22	26	50	53	27	28	513
September ..	87	74	19	23	10	10	17	48	42	29	15	374
October ..	41	66	6	20	10	9	10	33	21	11	7	234
November ..	39	49	3	4	6	9	11	20	7	18	16	182
December ..	40	20	3	4	3	7	4	1	10	8	6	106
TOTALS ..	830	847	167	280	127	158	203	314	330	175	260	3,691

Showing the Incidence of Naga Sore in Balliserra Valley. Ulcers and Naga Sores (1923-1924).
(Figures kindly supplied by Dr. Hugh Smith.)

Garden.	Dec.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	TOTAL.	Population.
Kalighat	8	1	10	7	5	8	29	28	40	7	4	10	157	1,275
Luckichera	7	3	2	1	3	3	6	46	5	26	27	6	135	769
Phulchera ..	0	0	0	0	0	0	15	70	70	12	7	4	178	956
Kakiachera	4	3	3	2	1	2	38	11	6	5	0	0	75	558
Jagchera ..	6	4	6	8	9	8	23	31	40	17	9	16	177	1,047
Kajurichera	13	6	10	5	4	14	120	33	31	21	21	8	286	856
Fuskuri ..	16	13	6	7	5	24	57	45	16	12	16	7	224	593
Tipperachera	12	14	18	13	9	40	66	82	43	27	17	20	361	616
Pootiachera	10	3	9	7	5	15	77	32	13	16	15	9	311	545
Sisalbari ..	4	1	4	5	3	4	29	14	6	2	2	5	79	363
Amrailchera	9	6	15	5	7	13	67	51	42	14	22	11	262	1,052
Gundichera	14	13	13	10	16	21	44	33	22	15	15	15	231	626
Hooglichera	6	3	3	5	17	13	122	44	31	14	4	10	272	855
Rajghat ..	9	6	3	6	4	8	254	48	22	14	18	17	409	1,067
Schinderkn	3	12	10	18	6	40	85	35	18	7	10	9	253	719
Burmachera	5	2	5	2	4	27	94	92	63	21	4	12	331	629
Udnachera..	19	16	27	24	30	61	133	103	66	42	43	35	599	651
TOTALS ..	145	106	144	125	128	301	1,259	798	534	272	234	194	4,240	13,177=32%

Rainfall, 93.56 inches.

Balliserra Valley Estates. Ulcers and Naga Sores. December 1924 to November 1925.
(Figures kindly supplied by Dr. Hugh Smith.)

Garden.	Dec.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	TOTAL.
Kalighat ..	7	10	8	4	2	9	36	27	16	9	19	13	160
Luckichera ..	10	5	6	2	8	3	6	27	16	9	19	13	107
Phulchera ..	4	0	0	0	0	0	32	18	16	4	1	1	76
Kakiachera	5	4	1	0	0	0	21	9	6	9	5	5	77
Jagchera ..	13	6	2	6	6	21	16	19	16	6	5	10	126
Kajurichera	19	16	13	17	19	32	52	75	50	24	26	19	372
Fuskuri ..	13	9	11	9	9	17	45	24	19	18	13	15	214
Tipperachera	13	12	10	4	9	17	30	48	53	48	32	23	299
Pootiachera	4	2	4	7	6	13	27	14	16	12	13	6	124
Sisalbari ..	3	1	3	3	2	6	16	18	10	7	7	4	80
Amrailchera	21	12	9	11	9	24	78	38	26	20	11	16	275
Gundichera ..	19	11	12	11	10	12	42	22	19	17	21	17	213
Hooglichera	6	9	5	5	11	24	77	45	16	9	17	6	230
Rajghat ..	10	7	4	2	7	15	25	35	37	36	25	14	217
Schinderkn	9	7	13	7	7	10	46	26	14	12	10	11	171
Burmachera	6	9	7	6	7	28	29	30	14	8	16	6	166
Udnachera ..	27	34	28	20	41	57	6	37	19	20	13	8	310
TOTALS ..	189	154	145	116	161	292	584	513	374	273	240	175	3,217

Balliserra Valley Estates. Uleers and Naga Sores. December 1925 to November 1926.

(Figures kindly supplied by Dr. Hugh Smith.)

Garden.	Dec.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	TOTAL.
Kalighat ..	4	7	4	9	8	10	16	9	20	15	11	7	60
Luckichera ..	3	3	1	2	1	5	22	18	24	7	8	7	51
Phulchera ..	2	0	0	0	0	3	41	28	18	12	5	0	109
Kakiachera ..	5	1	5	3	3	19	40	38	20	9	10	10	163
Jagcherra ..	11	3	6	7	11	14	31	45	19	15	9	4	175
Kajurichera ..	18	19	19	28	34	33	87	102	74	38	25	16	503
Fuskuri ..	8	11	17	8	12	32	36	33	30	22	19	20	248
Tipperachera ..	9	12	17	18	18	15	27	42	47	36	30	17	288
Pootiachera ..	8	9	7	7	8	18	58	52	40	32	23	19	281
Sisalbari ..	3	4	3	5	3	8	37	25	25	12	8	10	143
Amraichera ..	3	10	12	14	4	16	60	52	31	28	20	27	277
Gundichera ..	19	15	12	17	19	23	22	28	16	15	17	21	224
Hooglichera ..	8	9	9	11	9	26	38	42	28	20	18	9	227
Rajghat ..	15	13	15	10	7	18	71	48	32	28	29	23	309
Schinderkn ..	4	11	7	19	14	17	31	28	22	17	14	6	190
Burmachera ..	6	12	8	10	11	47	57	24	18	22	28	11	254
Udnacherra ..	20	15	17	37	24	34	68	39	15	11	9	10	299
TOTALS ..	146	154	159	205	186	338	742	655	479	339	283	217	3,801

These factors would naturally vary in different gardens; thus where water sore is common, these ulcers develop at those sites and a large number of such cases are found. There are places which abound in leeches more than others and ulcers follow such bites. Under the heading of abscess and boils I would like to mention that in some gardens the coolies complain of intolerable itching of the legs when they come back from work. They not only scratch the parts, but also pull off the hairs to allay this itching. So many of these ulcers start as small abscesses and boils.

Sex.—Out of 210 cases, 138 were males and 72 females, or 65.7 per cent. males and 34.3 per cent. females. This figure taken as a whole would be misleading if I fail to mention the fact that in certain gardens the female population were more prone to this disease while in others the reverse was the case.

Age Incidence.—Roughly 99.6 per cent. of cases were among adults and 0.4 per cent. among children and infants.

Season of Onset.—The season of onset of this disease varies with the place. In most of the places the disease appears after the first shower in the hot months. It begins in May and attains its maximum in July, when there is usually very heavy rain. It diminishes after the monsoon and in the cold months entirely disappears. Enquiries on this point had been made from various medical officers in Assam and the following were the replies obtained:—

Jafflong Tea Estate (Sylhet)—highest during the monsoon months—June to September.

Luskerpur Valley (Dr. Murphy)—March to October: highest in May, June and July.

Madhabpur Tea Estate (Dr. Gibson)—Rainy season: the height of the disease is in July.

Balliserra Valley (Dr. Hugh Smith)—April to August: worst in June and July.

Assam Frontier, Doom Dooma (Dr. Williams)

—Rainy season: worst in September.

Hautley Tea Estate, Golaghat (Dr. Bannerjee)

—Early part of the rainy season: highest in August.

The fact is clear that it is connected in some way or other with temperature, humidity and rainfall.

Distribution of the Disease on the Body.—This disease is not equally distributed all over the body. It is remarkably selective in its distribution. The ulcers have been found mainly on the legs and feet from the knees downwards. Occasionally a few cases have been observed on the elbow, forearm, dorsum of hand, back, thigh—both inside and outside, and on the nape of the neck. The distribution of the disease as observed by me has been given below.

Out of a total of 386 ulcers, 382 were found on the lower extremity, 3 on the upper and 1 on the trunk.

On the lower extremity they were distributed as follows:—

Thigh	..	11
Leg	..	232
Ankle	..	54
Foot	..	85

On the upper extremity—

Elbow	..	1
Forearm	..	1

On the trunk—

Hand	..	1
Back	..	1

In connection with the above the exciting factors causing the lesions in various parts are shown below:—

Thigh.—Trauma—2.

Itching from dermatitis—3.

Papules—2.

Boils—3.
 Scabies—1.
 Leg.—Trauma—82.
 Itching from dermatitis—100.
 Papules—15.
 Boils—8.
 Scabies—9.
 Leech bite—8.
 Ankle.—Trauma—26.
 Itching from dermatitis—9.
 Papules—6.
 Tuberculous—8.
 Leech bite—5.

cannot always be relied upon, as they are very often exaggerated or underrated. They cannot in most cases even definitely say the length of the time of their own sufferings. Their idea of the difference between the duration of 5, 10 or 15 days is vague.

At the earliest stage there is nothing but an abrasion or a breach on the surface of the skin. This may heal up or may be the starting point of the characteristic sore. Within a day or two a small ulcer forms which deepens considerably, and becomes covered over with a greyish-yellow, thick, purulent, bad-smelling slough. The



Foot.—Trauma—52.
 Itching from dermatitis—21.
 Papules—6.
 Boil—1.
 Leech bite—1.
 Water sore (ankylostoma)—1.
 Tuberculous—3.

Elbow.—Trauma—1.
 Forearm.—Trauma—1.
 Hand.—Trauma—1.
 Back.—Scabies—1.

Occupation.—Occupation has been observed to play an important rôle in the epidemiology of the disease. The ulcers are usually found in the following classes of people:—

- (i) Coolie class,
- (ii) people working in the fields who have to work bare-footed,
- (iii) those whose work exposes them to trauma, injuries, cuts, abrasions, etc.,
- (iv) those who are subject to leech bites.

Signs and Symptoms.—It should be taken into consideration that the narration of their own symptoms, as disclosed by tea garden coolies,

margins are always undermined and this tendency is noticed from the very beginning: in fact one can pass the end of the platinum loop for some distance all around the margin. The ulcer spreads very quickly and in the course of five to six days usually attains the typical shape and aspect of these sores. The shape of the ulcer depends on the nature of the trauma: when it is only a prick or a leech bite, it is circular; when it is a cut from a spade it is irregular. Lymphangitis is not a constant sign, though present in about half the number of cases. In a few it is present on the whole leg, while in a majority of them it is local and is confined around the ulcer. There was one case which simulated filarial elephantiasis.

The edges are undermined, the margins are considerably raised, indurated and give it a cup-shaped appearance, when the ulcer is circular. The depth of these ulcers cannot be judged by merely looking at them, as they are full to the brim with the characteristic slough. A thin watery sero-sanguinous discharge is also often seen running down from these sores, which is nothing but hæmolysed blood mixed with the purulent discharge from the ulcer. The

discharge is putrid and has a gangrenous odour. It is difficult to remove the tenacious slough but



at those places from which it is removed a red granulating raw surface is exposed which bleeds freely on the slightest touch.

No appreciable difference of colour on the surrounding skin could be noticed in my cases as the coolies are very dark coloured.

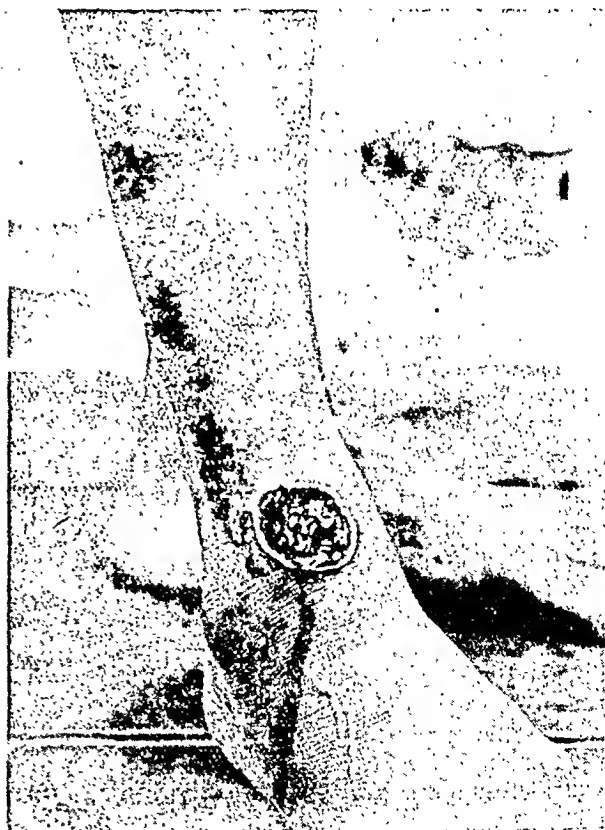
Pain, as a symptom, has attracted the attention of many of the previous observers. If one could rely on the statement of the coolie, probably he would say that every ulcer is painful; but if one cared to watch him for some time at a stretch, one would be convinced that pain is not a striking symptom in a majority of the cases. Pain depends mostly on the stage of the ulcer, and also on the site. When nerve filaments are exposed, the pain is very severe and is of a burning kind as the coolies complain of a sensation of feeling something very hot. When the ulcer is in a spreading condition with marked lymphangitis, this stage is also painful. With the exception of two coolies, I have never heard any others complain of loss of sleep due to pain, nor of being unable to attend the dispensary every morning. Walking and standing are painful, but the pain is very much relieved on lying down. On no occasion has involvement of the neighbouring glands been observed. There is little or no constitutional disturbance. The disease is afebrile throughout its whole course. In only 2 out of 96 cases could I detect fever by feeling the patient's pulse.

Self-limitation is one of the features of these ulcers, which have a tendency to stop spontaneously at the deep fascia, though this is by no means the rule. They may spread beyond the deep fascia, expose the tendons and muscles and sometimes may extend as far as the bone.

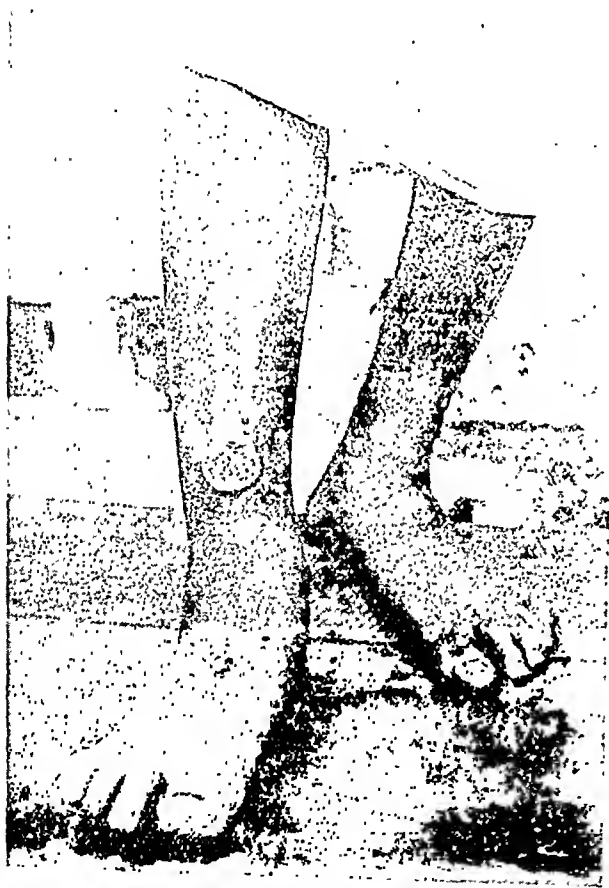
The ulcers are often multiple. The ætiological factors in a majority of cases can easily be traced if one has the patience to question a coolie and get at the truth.

Microscopical Examination of Direct Smear.—I had to remain satisfied with merely examining the smear under the microscope as I had not the equipment to make detailed studies. At first smears were taken from the undermined edges of these ulcers, but when cases clinically resembling Naga sore, as described by various observers, showed neither spirochaetes nor fusiform bacilli, I began to take 3 to 4 smears from every case, one from the discharge, one from the deep slough next to the granulation tissue, one from the undermined edge of the ulcer and one after scraping the granulation tissue from the margin of the ulcer. Such examinations were continued from day to day as often as possible. It is noteworthy that the microscopical findings were the same in all the smears taken from each case in Sylhet.

In Cachar, on the other hand, I could not do more than merely examine a few smears from each case as the time at my disposal was too short for making a more thorough examination of each individual case of ulcer at its various stages, as could be done in Sylhet.



The ulcers seen in Sylhet and in Cachar were at all stages of the disease. The earliest case that came under my observation was on its second day and it turned out to be a virulent ulcer. Otherwise, the cases, judged according to the statements of the patients—which in a majority of the cases were not very reliable—and the nature of the conditions present, were from the third to the seventeenth day of the attack. A few of the patients who went back to work apparently cured, left with only a granulating raw surface, but came back during the course of a week or a fortnight with the leg much swollen, and the ulcer again angry-looking. It was further observed that a certain number of cases, clinically resembling typical Naga sore, showed no spirochæte or fusiform bacilli in the smears at the first examination; but for some reason or



other these patients stopped coming to the hospital and in the meantime had taken off their dressings and gone about in the usual way; three or four days after this when they came back to the out-patients' department, either voluntarily as the swelling had considerably increased and walking was more painful, or because they were compelled by the authorities to attend the hospital, examination of smears from these ulcers now revealed a large number of fusiform bacilli.

I would here like to classify the cases into two groups, those in which repeated examinations were done and those in which only one or two examinations, as conditions permitted, were made.

A. Repeated examinations were done—

No. of ulcers.	Findings.	
156.	Fusiform bacilli	59
	Spirochæte and fusiform bacilli	4
	Spirochæte alone	2
	Negative findings	91

B. Examined only once or twice—

No. of ulcers.	Findings.	
230.	Fusiform bacilli	65
	Spirochæte and fusiform bacilli	1
	Negative findings	164

No spirochæte or fusiform bacilli could be found in ulcers on other parts of the body except on the portion from the knee downwards.

Dr. Ramsay told me of a case he had seen which he thought to be a typical Naga sore; the ulcer was situated on the nape of the neck and he found large numbers of fusiform bacilli in the smear.

Duration.—Even with treatment they take as long as six weeks to three months to recover. Osteitis and osteomyelitis take a much longer time. I saw one case where the patient was laid up for 15 months and pieces of necrosed bone had to be extracted on two occasions.

I had not the opportunity to observe how long the ulcer would take to heal if left untreated; or if there was any tendency for these ulcers to spread without treatment.

Prognosis.—Prognosis is usually good except when bone complications set in. In ordinary cases recovery is the rule. The disease itself is not fatal though intercurrent infections like pneumonia, which occur very frequently in tea gardens, may kill the patient.

Complications and Sequelæ.—Complications are not very common. Osteitis and osteomyelitis are sometimes met with. Tuberculosis of bones and joints may be a sequela, as all the patients suffering from bone and joint tuberculosis complained that the disease appeared first in the form of an ordinary Naga sore, which took its usual time to heal, but in the course of a few months the scar tissue broke down. Usually thin, supple scars are left. The author in the course of his investigations never came across any case of deformity which could have been accounted for as an after-effect of these ulcers.

Contagiousness.—The disease is not contagious. Parts which are opposed, and as such naturally come into constant contact with the ulcer, are not affected.

The ulcer has no tendency to spread among members of the family or among those who come into intimate contact with the patients.

Immunity.—Newly recruited coolies are equally affected with those who are born in the gardens. Coolies suffering from these ulcers one year may get the same kind of ulcer next year on some other part of the legs. No immunity is conferred on patients by an attack of Naga sore.

PART II.

DISTRIBUTION OF THE DISEASE IN VILLAGES AND IN TOWNS.

The cases I examined were mostly among tea garden coolies. With a view to finding out the incidence of the disease in villages and in towns quite adjacent to these gardens, I examined the cases I got in two villages and also at Srimangal, a town situated within a distance of two miles from the nearest tea garden, where there were many cases of ulcer.

These villagers are divided into two classes; firstly those who earn their livelihood by working as day labourers in tea gardens and secondly those who plough their own lands.

The soil was found to be the same at both places and the conditions were identical.

In each of the two villages the number of inhabitants was two to three hundred, approximately, while the incidence of the disease was from 2 to 3 per cent. at a rough estimate, and all these cases were confined among those who used to work in the gardens as day labourers.

A disease which roughly speaking resembled "ulcus infantum," as described by Castellani and Chalmers, was commonly met with among children, but these have not been included in the above figures.

At Srimangal, on the other hand, I could get only four cases which appeared to me more like cases of scabies than of Naga sore.

Habits of the People in whom the disease is found.—Coolies for tea gardens are recruited from Bengal, Bihar, Orissa, Madras and Assam. It is needless to mention that coolies have a very crude idea of sanitation. They are ignorant and are to some extent superstitious. They are guided by their own laws of sanitary principles. So long as they are left to fend for themselves, they consider a cut as a cut, and cannot conceive that the consequence of a cut, if neglected, may prove fatal. Their nostrums and quackeries too are remarkable. Thus the first thing they do if they get a cut is to put some mud on it and if the wound still bleeds, some chewed grass, which they think act as hæmostatics. When they go home they apply a paste made of the leaves of some plants, alone or mixed with cowdung, which forms more or less a plaster-like coating on the ulcer. It is left there till it falls off. When the ulcer spreads and it becomes increasingly difficult for them to walk and attend to their ordinary work, it is then that they go to the hospital for treatment.

Tea garden hospitals usually have accommodation for a limited number of in-door patients. It is surprising that coolies who find it difficult to walk would much rather prefer to stay at home without any treatment than seek admission as in-patients. It might be thought that this is because a coolie has a large family to support and his wife has children to look after; this cannot be taken to be a serious deterrent factor in his aversion to stay in hospital. In Cachar I have seen at least three to four cases of Naga

sore as in-door patients in every hospital in Dr. Ramsay's practice, who, when they come to stay, bring their wives and children along with them. The practice in the gardens in Sylhet that I visited is to pay full wages to those who cannot attend to their work on account of sickness, while in Cachar I have seen an entirely different practice being followed. The company pay doles in the form of provisions, such as rice, dal, meat, etc., to all who accompany the sick and stay in the hospital.

The former is undoubtedly cheaper than the latter. I have been given to understand that the latter is only a tentative measure to attract these people to hospitals and to make the treatment more popular.

It would be superfluous to say that coolies go bare-footed.

Males are given hard work, such as hoeing, while females and children are given lighter work, such as plucking, manuring, etc.

Upper class Indians who have to go out to the fields generally wear shoes. I have seen many going bare-footed. They always keep their bodies covered.

Coolies are able-bodied and healthy, and bathe every day in shallow running hill streams.

The Coolies' idea of the source of infection.—There is a vague idea among the coolies that the source of the infection is from exposure to a plant, *Mimosa pudica*, Linn, which grows wild in Assam.

Epidemicity.—Patterson (1908) observed an epidemic of this disease in Tezpur in 1908 and described it in the following manner:—

"This year the typical phagedænic ulcers have swept like a plague up the whole of Assam on both banks of the Brahmaputra and temporarily incapacitated many thousands of coolies from work during the busiest months of the tea-making season. On the south bank, Nowgong, Golaghat and Jorhat suffered heavily, and in Dibrugarh district most of the factories have had their labour forces literally decimated. The aggregate loss of labour throughout the valley must be enormous."

It has already been mentioned that the disease is practically confined to one place, and that neighbouring and contiguous gardens often escape. It does not sweep over the whole place in the sense that one garden after another is affected. The epidemic is more or less local. In this respect it differs from other epidemics, e.g., of cholera.

The disease does not follow any distinct line of human communication nor travel from one place to another.

Yearly recurrence of the disease at one place is not the rule. One year one garden may be badly affected, next year it may be free.

The general epidemic usually recurs once every three to five years. Endemic and sporadic cases are met with every year.

PART III.

DESCRIPTION OF *ULCUS TROPICUM*.

Ulcus tropicum is a widely distributed disease in the tropical and sub-tropical regions of both hemispheres of this globe. A variety of names has been given to it: e.g., Ulcer of Yemen, of Aden, of Cochin China, of Annam, of Mozambique, according to the locality where it is found. At present all these ulcers have been grouped under one term—*Ulcus tropicum*. Various ulcers having phagedænic characters and showing spirochætes and fusiform bacilli have been described as *ulcus tropicum*. Thus the hospital gangrene of pre-antiseptic days was thought by La Dantec, by Crocket and by Manson to be allied to this disease, while Blaise and Brault asserted that the latter might be complicated with the former. Gangrenous-looking ulcers seen in debilitated conditions, in street beggars, in cachectic conditions among soldiers, sailors, etc., have been described under this term by Adams, Corpus, Sceube, Mühlens and various other observers, simply on the strength of their finding spirochætes and fusiform bacilli in all these ulcers. Stelwagon's remarks on this term seem to be very appropriate:—

"The term seems to be both a comprehensive and an uncertain one in the tropics, being largely, if not wholly employed to designate the occasional accidental terminal ulcerative condition of several diseases, such ulcers being found with oriental sore, frambœsia, tuberculosis, syphilis and other diseases. It doubtless very often means the addition of a pyogenic or other factors to one or other of the diseases named and which to a variable extent change the ulcerative character of the already existing disease."

In the light of researches of the present day on these ulcers, as described by various authors, if one were to analyse them, he would be tempted to class them as follows:—

- (1) *Ulcus tropicum* pure or phagedænic ulcer.
- (2) Hospital gangrene.
- (3) Ulcers met with in debilitating conditions, in warfare, in street beggars, etc.
- (4) Terminal ulcers—usually of the form of gangrene.

I will now make an attempt to describe very briefly the conditions in each of the above diseases, compiling them from the various works on the subject, a list of references to which will be found at the end.

Ulcus tropicum is a rapidly spreading phagedænic ulcer which is commonly met with in warm countries. The ulcers are almost invariably found on the exposed parts of the body: they occur most commonly on the legs, ankles and feet; less frequently on hands and forearm. They begin as a small itchy painful papule having the appearance of a mosquito-bite, and in some cases they start from often a slight trauma. The ulcer quickly spreads, assumes its characteristic appearance, has a foetid discharge and is usually

covered over with a greyish yellow slough. Self-limitation is usually the rule. Besides cocci and similar micro-organisms, fusiform bacilli and spirochætes are found in numbers.

Hospital gangrene is a rapidly spreading necrosis of tissue caused by various pyogenic and putrefactive organisms in conjunction with anærobic bacilli, the latter probably playing a very important part in the spread of the disease. There is no tendency for this disease to limit its spread. Fusiform bacilli and spirochætes have been observed to be present in large numbers in these forms of ulcers.

Ulcers met with in debilitating conditions, etc.—These forms of ulcers which start from various skin diseases are very commonly met with in street beggars. Street beggars are museums of various forms of skin diseases, which are induced by their uncleanly habits favoured by the poor nutrition of their bodies. Ulcers are secondary to the skin diseases which are invaded by a variety of pyogenic organisms. These ulcers seldom have the characteristic appearance nor do they ever spread so rapidly as in *ulcus tropicum*. Previous authors make little reference to the bacteriological findings in these ulcers as it is not clear whether fusiform bacilli and spirochætes have been recovered from them.

Terminal Ulcers.—These are met with in hospitals in terminal conditions and are of the nature of gangrene which has a tendency to spread rapidly: they are found in connection with tuberculous ulcers, cachexia of malaria, kala-azar, dysentery, profound anæmia and other similar conditions.

My best thanks are due to Dr. D. C. Chakravarti, F.R.C.S., Surgeon, Campbell Hospital, for drawing my attention to a case he has been treating in the hospital for some time past. The patient is a boy about 14 years old, extremely cachectic who has a gangrenous ulcer with a greyish tenacious slough and a foetid discharge on the lower third of the leg. I happened to go to the hospital after the leg had been kept in a ensol bath for a long time and the ulcer was dressed. I got numerous spirochætes and fusiform bacilli in a smear from the slough.

Bacteriology of Ulcus Tropicum.—I will narrate here very briefly the bacteriological findings of cases of *ulcus tropicum* as mentioned by various authors.

Plaut (1894) first drew attention to the presence of spirochætes and fusiform bacilli in these forms of ulcers. Vincent (1896) found spirochætes in only 40 out of 47 cases of *ulcus tropicum*. He thought that the fusiform bacilli, which were a constant factor, were pathogenic and were the cause of tissue necrosis. Crendiro-poulou (1897) obtained an anærobic bacillus—*Bacillus l'Yemen*—which when cultured and inoculated into animals, produced ulcers which resembled these sores. Prowazek (1907) first brought forward the hypothesis that *Spironema schaudini* was allied to *Spironema vincenti*, was pathogenic, and was the cause of *ulcus tropicum*.

Shattuck (1907) in his "Notes on Chronic Ulcers occurring in the Philippines" mentioned that 94 per cent. of such cases could be classed as syphilitic. Caboïs (1908) was convinced that there was destructive *ulcus phagedænicum* due to *B. phagedænicus*. Gros (1908), on the other hand, found a Gram-negative diplococcus in some cases, but he failed to obtain any spirillum while smears were rich in fusiform bacilli. He did not associate the spirillum of Vincent with these ulcers.

Bulkey (1910) in his extensive observations on skin diseases in the Far East doubted the existence of these sores as a specific entity.

Eggers (1915) found various spirochætes from a study of 2,874 specimens in only 9.3 per cent. of his cases. He thought that a spirochæte described by him as Eggers' type A (13 microns long, 3 to 4 regular convolutions of considerable amplitude) was the typical organism of *ulcus tropicum*. Mendelson (1919) reported 100 cases and asserted that 10 per cent. showed spirochætes—all of Eggers' Type A. He was inclined to look on this organism as the same as the *Spironema schaudini* and he thought it to be a superimposed infection on already existing ulcerations. According to him this spirochæte is not limited to a disease of distinct clinical features: in fact it can be found in different diseases with great varieties of clinical features.

Kritchevsky and Seguin (1921) do not think that these two organisms growing in symbiosis are the cause of Vincent's angina, a disease almost similar to *ulcus tropicum*. They contend that under the name of fusiform bacilli several organisms have been confused.

(i) Plaut's bacillus—a big fusiform bacillus, motile, Gram-negative with many cilia: very big and visible under the ultramicroscope; can be very well stained according to Fontana-Tribondeau methods.

(ii) Bacillus of Schmallmire—long needle-shaped, thin, sometimes curved, sometimes spironemacea type, feebly motile and rotating on its own axis; Gram-negative: non-ciliated: an obligatory anaërobe. Grows flocculent colonies in deep serum agar. Odour acid but not putrid. This is non-pathogenic to animals.

(iii) Fusiform bacilli—Non motile: Gram-negative: non-ciliated: when stained with Giemsa, reddish chromatic granules are constantly seen in their protoplasm. It is an obligatory anaërobe and cultures are strongly putrid in odour: these authors do not think that these organisms are by themselves pathogenic.

The bacilli found by various investigators like La Dantec, Petit, Boinet, Blaise and others have not been mentioned as they have been considered to be a doubtful ætiological factor in the causation of the disease.

Corpus (1924) in his study on these ulcers came across spirochætes which he thought were the exciting causes. He arrived at positive findings in 35.5 per cent. of his cases.

Castellani, Manson, Stitt, and Scheube all believe in spirochætes and fusiform bacilli as the organisms responsible for this condition.

Is ulcus tropicum the same as Naga sore?—Patterson (1908) first drew attention to an epidemic of Naga sore prevailing widely in Assam and showed that from a clinical standpoint the disease was similar to *ulcus tropicum*, as described by various European writers. Fox (1921) made a bacteriological study of a few cases of ulcers and found spirochætes and fusiform bacilli in a majority of them; in some, the exact number of which he does not mention, he failed to obtain spirochætes.

Is the disease studied in Assam a distinct clinical entity?—From the descriptions, which have already been given of these ulcers, one would not hesitate to pronounce the opinion that they belong to a distinct clinical group. Necrosis before suppuration, fœtid discharge, tenacious slough formation, deep circular ulcers, indurated and raised margins, absence of fever and of enlargement of glands are features which are distinctly characteristic. When they occur among a large number of the population, and mostly on legs and feet, there is no reason to incriminate them with syphilis. However, some doctors, who have had little or no experience of tropical diseases, have often mistaken them for syphilitic ulcers; this led them to try antisymphilitic measures, but with no success whatsoever.

Discussion on the nature of the cases obtained in Assam.—In order to investigate the nature of these ulcers, which is the subject of study embodied in these pages, one has to take into consideration the clinical and bacteriological findings relating to them. From the descriptions given of the signs and symptoms of *ulcus tropicum*, one cannot find any marked difference between *ulcus tropicum* and the ulcers met with in Assam. Fox (1921) analysing the difference, points out that *ulcus tropicum* does not appear in an epidemic form. But Ruge, Muhlen, Verth and Adams all mention its epidemic prevalence. The only point of difference seems to be in the onset of the disease as a painful papule in *ulcus tropicum*. All observers, however, agree that trauma plays some part in its ætiology, though at times the injury may be so slight as to escape notice. They point out that at first there is a breach in the continuity of the surface of the skin through which the specific organisms—spirochætes and fusiform bacilli—gain entrance into the wound and cause the appearance of the painful papule or the purulent bleb.

On carefully questioning those who mentioned the appearance of a papule at the initial stage, I learnt that poisonous herbs, insect bites and exposure of the feet to irritating manures gave rise to intense itching of those parts. Scabies, localised papular and pustular eruptions accompanied by intense itching were also very common. These parts when scratched caused a breach of the continuity of the surface of the skin through

which the specific organisms gained entrance. Thus it will be clear that the papules are not secondary to the invasion of the wound by the specific organisms.

Regarding the question of pain which is frequently met with in *ulcus tropicum*, I could not find anybody complaining of those papules being painful; on the other hand they were very irritating.

From the bacteriological findings regarding the cases met with in Assam, which have been already mentioned, it will be seen that in only 5 cases out of 386 ulcers, or in 1.3 per cent., was I able to obtain both these organisms, while in 66.06 per cent. of cases neither of them could be found. So whilst these ulcers clinically resembled *ulcus tropicum* in every detail, they differed as far as the bacteriological findings were concerned.

Much has been made of the presence of spirochætes and fusiform bacilli in ulcers. Definite diseases have been diagnosed through the identification of the symbiosis living of spirochætes and fusiform bacilli, and through the membranous character of the ulcer. But one should bear in mind that the mere presence of a spirochæte or a fusiform bacillus does not establish that the ulcer is caused by these organism. Spirochætes or fusiform bacilli alone or growing in symbiosis are often encountered in ulcerative and gangrenous conditions of the lungs, Vincent's angina, mercurial stomatitis, pyorrhæa alveolaris, cancrum oris, various ulcerations on skin, gangrene, noma and in various other conditons. Differentiation of one spirochæte from another is not easy. It is not seldom that besides these *Spiro-nema vincenti*, other spiro-nema are met with. Even authors like Meyer and Gerber confused the spiro-nema of angina with the usual mouth spiro-nema. Saprophytic spirochætes, on the other hand, are very commonly met with. It has not yet been found possible to establish the pathogenicity of these organisms, encountered so frequently in ulcers, by cultural and inoculation experiments, which till now have met with negative results.

The source of these organisms.—When one takes this fact into consideration, that these organisms have been encountered in ulcers situated below the knee, one would naturally believe that contamination with the soil is the cause of the presence of these organisms in such ulcers. These organisms have on rare occasions been found on ulcers situated on the buttocks and on the nape of the neck. When coolies feel tired during work they often sit on the ground and thus the buttocks come into contact with the soil. Their habit of putting a lump of earth on wounds is likely to be responsible for the presence of fusiform bacilli in ulcers on such parts of the body.

I have already mentioned the five cases in whom repeated examinations failed to show the presence of fusiform bacilli, but in whom, when they stopped treatment for some days, pulled off their

dressings, and walked about in the mud, infection with this organism took place.

Thus it can be suggested that wounds become contaminated with fusiform bacilli from the soil and it seems probable that a certain type of soil is charged with these organisms much more than others.

Are these ulcers septic in origin?—What is usually meant by sepsis is an invasion of an ulcer by pyogenic cocci which have a great tendency to invade deep tissues, and enter the circulation through lymph and blood channels unless arrested by the defensive barriers of the human system. As a result of this, constitutional and local symptoms in the form of fever, malaise, and enlargement of neighbouring glands are commonly met with. A strikingly different condition has been observed in the cases in Assam. It seems highly improbable that these ulcers are the result of an invasion by common pyogenic organisms.

Nature of the organisms responsible for the conditions seen in Assam.—The causative organisms in cases of *ulcus tropicum*, so far described, are *Treponema schaudini* and fusiform bacilli. There has been a consensus of opinion that the organisms described from *ulcus tropicum* are of the same nature as those from Vincent's angina of the throat, and that *Treponema schaudini* of Prowazek is identical with *Treponema vincenti*. The determination of the cause and effects can only be effected by finding the organisms in the majority of the cases and by producing similar results from cultural and inoculation experiments. From the presence of these two organisms growing in symbiosis in only 1.3 per cent. of the cases examined in Assam, one cannot without grave doubts connect them as the factors responsible for the ulcers. The same remarks would equally apply to fusiform bacilli being alone liable to cause such conditions. As neither of these organisms were found in 66.06 per cent. of cases, weight is added to the argument that there must be some other factor which is responsible for the production of these ulcers.

I have already mentioned the five cases of typical ulcers on the feet of coolies in which repeated examinations failed to show any spirochæte or fusiform bacillus. For some reason or other, best known to themselves, they discontinued their daily visits to hospital for a few days. They took off their dressings, walked about with their ulcers exposed and came back to the hospital for treatment, as the swelling had increased and it was painful on walking. Examinations then showed enormous numbers of fusiform bacilli, and clearly prove that these bacilli are secondary invaders.

Corpus, Mendelson and Eggers all mention that in a small percentage of their cases they could find a spirochæte.

An organism, which I have very constantly come across in these sores, is a diplococcus—round, of a moderately large size—growing inside pus cells. Pus cells with diplococci at all stages

of growth can easily be seen in any smear from such a case. Thus cells with scanty infection, moderate infection, and very heavy infection about to cause the cell to burst and clumps of organisms lying free will be seen.

I have no special reason to connect these diplococci with the ulcers, except their constant presence in leucocytes, the peculiar situation of their growth and the negative finding of spirochaetes and fusiform bacilli in a large proportion of cases at all stages of the disease. This is a hypothesis brought forward tentatively, and unless it is supported by cultural and other experiments, proves very little. However, I am glad to mention that Col. Acton, Professor of Pathology and Bacteriology in this School, is making an attempt to solve this side of the problem and till his results are published, it is best to refrain from making any remarks on these diplococci.

Mimosa and Naga Sore.—The mimosa is a sensitive, shrubby herb with stem and rachis copiously bristly and prickly. It is not confined to Assam alone but grows wildly throughout the hotter parts of India. There is no truth in the coolies' belief that mimosa gives rise to such a condition. Our personal experience is that this plant minus the thorns is harmless when rubbed on the skin.

PART IV.

AN EPIDEMIC—IS IT AN INSECT-BORNE DISEASE?

The views held by the previous observers regarding the transmission of the disease from one place to another were:—

- (1) Direct transmission.
- (2) Indirect transmission, through flies.

Ruge and Muhlen mention that inoculation experiments with the pus of these ulcers containing spirochaetes and fusiform bacilli, produced negative results, but they were inclined to believe that these ulcers are directly transmitted. Blaise inoculated himself with a negative result and could only produce atypical ulcers in guinea-pigs. Corpus thinks that the disease he encountered in the Philippines was contagious, being usually found in school children who were in constant contact with one another, although he mentioned the ulcers being found only on the legs and feet below the knee. Fox made an attempt to produce the sore in men and animals with an emulsion in saline of the discharge from the sore. Except in one case in a man where a typical Naga sore developed, his experiments met with negative results. My observations do not lend support to this method of transmission. Parts of the body which naturally come into contact with ulcers remain unaffected. Thus I have seen ulcers situated behind the knee surrounded by slough on a very large surface, but there was no tendency for these parts to be ulcerated.

The indirect method has been thought to be by means of insects. Fox mentioned 14 coolies on one tea garden who developed Naga sore on

the site of the puncture, when inoculated with cholera vaccine. He also mentioned the report from a doctor of the formation of Naga sores on unhealed scars of vaccination. A similar occurrence is reported by Blanchard where tropical phagedæna supervened on vaccine pustules.

The presence in large numbers of small flies at the time of the year when these ulcers are met with in Assam, has been thought by various observers to be associated with an epidemic of Naga sore. This belief has been found to be current in the tea gardens of Assam not only among the coolies but also among Indians and Europeans. These flies have been identified as *Siphonella funicola*, Meij. They are often called mango flies. They make their appearance towards the end of April and can be seen till the end of July or the beginning of September. They are frequently seen flying round the eyes whence the name of "eye-flies." As soon as a badly smelling wound is exposed, these flies are at once attracted to it and settled on the ulcer. In fact the patients find it most annoying: they have constantly to move their hands to drive away these pests.

These flies have been thought by Patterson, Fox and Wright to convey mechanically the infective material from an ulcer to a healthy wound. Wright succeeded on one occasion in infecting himself on his arm in this way.

I have done several experiments with these flies on myself, on laboratory assistants, on our peon and on a few coolies, but I have never met with any success.

The experiments are described below:—

A. Stray flies were caught and a few kept in a wide-mouthed bottle as controls; the rest were fed in another wide-mouthed bottle on an ulcer which showed a rich infection with spirochaetes and fusiform bacilli. These flies were then fed within an hour on the exudate from some scratches on the skin of either the arm or the leg of a healthy man, made with the sharp point of a needle which had been previously sterilised by burning in a flame. The part was then lightly bandaged up with a clean piece of cloth which was not sterilised.

The feeding experiments were repeated once, sometimes twice a day on the same wound for as long as the flies were alive. It may be mentioned that the scab had to be removed every day from the wound, as otherwise the flies would not feed on it.

(Control experiments were not done as they were found unnecessary.)

Results.—This experiment was performed many times without any success.

B. Three patients were selected, one having a typical spreading phagedænic ulcer with numerous spirochaetes and fusiform bacilli, the other two with small atypical ulcers. Stray flies were caught and fed in a wide-mouthed bottle on the positive case; the flies were then transferred to another wide-mouthed bottle with a view to re-

PLATE I.



Showing fusiform bacilli and spirochaetes in a direct smear. Stained with Giemsa.

PLATE II.



Showing diplococci in a direct smear. Stained with Giemsa.

PLATE III.



Fusiform bacilli as seen in the gut of *Siphotella* 36 hours after ingestion.

duce the chance of direct infection, if such was possible, and then fed on the ulcers of the two atypical cases one after the other. This was to ensure that the flies had fed not only on the infective material but also on other two ulcers.

The three patients were then made to sit side by side inside a large mosquito net in which a large number of the flies, previously fed on the three ulcers, were let loose. From time to time the flies were disturbed, so that, as far as possible, all the flies were induced to feed on the three ulcers. This experiment was repeated for six consecutive days.

Results.—Every day smears were taken to see if they had been infected with spirochaetes and fusiform bacilli through flies. The two atypical ulcers remained the same clinically as well as bacteriologically. No marked change could be noticed in the healing process of these ulcers.

C. Some of the flies which had fed on typical cases were collected and taken to the laboratory for dissection.

In the feeding experiments it was the rule to take some of the flies to the laboratory for dissection. In every case it was found that the flies had fed on the infective material, as we found fusiform bacilli and spirochaetes in their gut.

The distribution of the disease on the body does not bear out the fact that these flies can act as mechanical carriers. Injuries are not confined to the legs alone but other parts of the body are also subjected to such injuries, to a lesser extent. On the other hand Naga sores are mostly found on the legs and in only a certain class of people.

Thus experimental and other observations do not support the belief prevailing so extensively in Assam that these flies can be held responsible for an outbreak of this disease, merely because the seasonal appearance of the two coincides so closely.

Spirochaetes and fusiform bacilli are readily taken into the gut by these flies. These organisms can be recovered from the stomach and crop for about six hours (average period) after a feed, and after 36 hours from the intestine and rectum.

I have not found any evidence to lead to the belief that multiplication of these organisms can take place in the gut.

I would now refer to Plate III. The drawing has been made from a slide showing these organisms in the gut of a fly 36 hours after a feed. The fusiform bacilli here will be seen to have assumed a different shape and size; thus they have not only become smaller but very distinctly rounder and broader while the chromatin granules have considerably swollen up. In some only one granule is seen, in others two. These bodies are constantly found in the gut of the flies which are dissected a long time after a feed, while such bodies are never seen in stray flies, nor in those which had been fed on ulcers in which fusiform bacilli are absent.

Treatment.—Dr. Hugh Smith in Sylhet and Dr. G. C. Ramsay in Cachar mention that they

have found in Electrolytic Chlorogen the only drug on which they can rely for the treatment of these cases. Dr. Ramsay has made extensive observations on this line and he advocates prolonged baths in Pot. Permanganate at the beginning, followed by a bath and a cold compress with E. C. diluted in water. Dr. Hugh Smith, who has also a vast experience in the treatment of such cases, on the other hand, is in favour of using iodoform and a charcoal poultice for rapid removal of the slough. When the slough has once disappeared, both these workers would have the wounds dressed in normal saline soaked in lint.

A casual remark on the treatment made to me by some of the Indian doctors practising in the tea gardens in Assam is interesting. Many of them have expressed the opinion that normal saline is a specific. What I am inclined to believe is, that the ulcers have the natural tendency to take a turn towards recovery as soon as steps are taken to remove the offending discharge every day and to keep the ulcers clean.

I have been told that antimony in the form of urea stibamine, arsenic in the form of salvarsan, and local treatment of various sorts had been tried but there has not been any success.

Prevention.—Before any measure can be formulated one should take into consideration the various factors which contribute to the ætiology of this disease. As has been pointed out elsewhere and also by various other observers, cuts, abrasions and injuries constitute a large proportion of these cases; it is natural, therefore, that one should advocate that steps be taken to prevent this. One cannot recommend a change of occupation for the coolies, as their duties in the fields expose them to such cuts. Such action would mean that the largest industrial concern of Assam would have to be closed down. The only possible solution that one finds as a protection against cuts and injuries is to recommend the wearing of putties. Dr. Ramsay, with the help of the managers of the various gardens in Cachar comprising the estate, tried to introduce these among the coolies but met with opposition. If the system of wearing putties can be made compulsory throughout the tea districts in Assam, the gardens where cases of this disease are met with every year will certainly derive the greatest benefit; also it will materially reduce the number of traumatic ulcers. Intolerable itching of the legs from herbs, caterpillar stings, etc., will also be remedied. In those gardens where leech-bites are very frequently met with, this will give an additional protection.

The next point to discuss is what should be done when the coolies have already injured themselves. Dr. Ramsay* was the first to introduce the method of sealing up the wound with Friar's balsam as soon as a cut is detected. In his practice I have found the sirdars carrying pots

* My information is from Dr. Hugh Smith, but I am open to correction.

containing tincture of iodine and Friar's balsam.* The sirdars are really in charge of the supervision of the work of the coolies and remain with the latter as long as they work in the fields. The coolies report to the sirdars as soon as there is a cut and the latter will at once apply the medicines. Dr. Ramsay is positively certain that this has materially reduced the number of his cases.

I have no comments to make on this excellent method of preventing the organisms responsible for the causation of Naga sore from penetrating into the wound. If I am allowed to go a step further I would like to suggest (1) that the sirdars may be trained that injuries and wounds should be carefully cleaned, before they are touched up with iodine, as I have myself observed some of them dabbing the antiseptic on the mud on the wound; (2) that the wounds should then be protected from contamination with the specific organisms by some cotton-wool and bandage, as there is strong reason to believe that these organisms grow in the soil. Cannot the field inspector—Tilla Babu—be taught in first aid and his services be utilized?

There would not be, I am sure, any contrary opinion when I suggest that coolies having any cut or injury on their legs should be persuaded to stay in the hospital during the ulcer season. This might be looked upon as a very expensive affair but when one compares the number of injuries with that of the ulcers following them, one would not hesitate to act according to what I have said. My information from some of the sirdars is that a very large proportion of these injuries turn septic at the season and assume the characteristic appearance of the ulcer.

Thus in Rajghat, a garden in Sylhet, the average duration of absence from work in 1926 was about 41.4 days. If these people could be persuaded to stay in the hospital, probably it would have taken an average of three to four days for them to have been able to resume their work.

The best means by which they can be induced to stay in the hospital is by giving them a sum equivalent to their daily wages. In the case of a female, if the children cannot be made to go to work without the mother, they too should be likewise remunerated. Against this it has been argued that people with very slight injuries would seek admission. But obviously it would depend on the medical officer to choose his cases—whom to admit and whom not to admit in the hospital—and not on the opinion or wish of the patients.

Among those gardens I visited, I noticed in Cachar alone that there has been a growing tendency and eagerness among the patients to come and stay in the hospital. They bring with them their wives and children. All are given provisions every morning and are allowed to cook

their own food there. This, I think, is more expensive than the plan that I have advocated. In most of the tea gardens the ulcer cases attend the hospital every morning where they are dressed. It must be admitted that, apart from the question of pain, walking prevents the healing and retards the progress. Besides, these people when they are at home attend to their domestic duties as much as their condition permits. Rest is the principal part of the treatment and it is not likely that this can be carried out at any other place than the hospital.

CONCLUSION.

Whatever the nature of the invading organisms may be, one can safely assert from the facts, which have already been mentioned, that the contamination of the wound takes place from the soil, and it seems probable that certain soils are charged with the organisms much more than others.

I would here like to mention a case which I was able to follow from the beginning to the end. The man hurt himself below the ankle with a bamboo splinter. The wound was at once cleaned and dressed with tincture of iodine and bandaged up. In spite of the change of his dressings, daily an ulcer formed, slough appeared on the third day and the ulcer began to spread rapidly for five or six days, when it assumed the typical characters. The diameter then was an inch and a half and its depth as far as the deep fascia. The ulcer was kept covered all along and I am positively certain that no fly ever sat on it. The man walked about bare-footed and his dressings used to get soaked with muddy water. When this ulcer had almost healed up he hurt his other foot in the same way at the front of the ankle. Within a minute the injury was dressed as before. Notwithstanding this, the ulcer spread as before and after a week it occupied almost the front of his ankle. As it was kept constantly covered with dressings, flies never got the chance to settle on this either. But, as I have mentioned before, he had to walk about in mud as we were experiencing heavy showers. It is very likely that these injuries got contaminated with the specific organisms from the soil, which turned them into characteristic ulcers.

Whether soil is the only source of infection, I am not prepared to say. Dr. S. Datta, F.R.C.S., Surgeon, Carmichael Medical College Hospital, mentioned to me a few cases in coolies he came across in the out-patients' department of that hospital during the rainy season, where he found a phagedenic condition of the ulcers, which occurred chiefly on the legs, as a result of some injuries met with while working in coal. Smears were examined and spirochaetes were found. The patient with the ulcer on his leg, whom I had the privilege of examining in the Campbell Hospital through the courtesy of Dr. Chakravarti and whom I have already referred to, is also a coolie who works in coal in a ship.

The recurrence of the widespread epidemic in Assam every 3, 4 or 5 years can be accounted

* The attention of the writer has been drawn by Dr. Strickland to a letter written to him by Dr. Hugh Smith of Sylhet stating that he has also been practising the method of treating wounds, as soon after the injury as possible, with iodine and tinct. benzoin co.

for in the following way:—It is only when the temperature, humidity and rainfall reach the optimum for the growth of these organisms in the soil almost all over the place that this widespread epidemic is seen.

I have already mentioned the results of the experimental observations showing how far the eye-flies, *Siphonella*, can be incriminated in the spread of the disease; the results were almost entirely negative.

Regarding the nature of the invading organisms, it seems not at all improbable that these spirochaetes and fusiform bacilli, which so long have been looked upon as being responsible for these ulcers, are merely saprophytes, the nidus of the sore forming a good medium for them to grow upon. If this view can be accepted, then it is certain that we have not yet been able to arrive at the cause. I have mentioned the constant presence of some intracellular diplococci in these ulcers, but further work is necessary before the two can be logically connected with each other.

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A CRITICAL EXAMINATION OF THE ANTIMONY TESTS FOR KALA-AZAR.

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LIEUT.-COL. R. N. CHOPRA and his co-workers have during the last year communicated three papers on the subject of the antimony test for kala-azar (Chopra, Gupta and David, 1927; Chopra, Gupta and Basu, 1927, 1927a). A fourth paper which was to have been read had time permitted at the F. E. A. T. M. Congress last year will doubtless be published with the

proceedings of this congress within a year or so. The first is a preliminary paper recording the observation of the reaction on which the test is dependent and suggesting that it might be used as a diagnostic method in kala-azar. In the second paper the writers give their further experience with the test and compare it as a test for kala-azar with the aldehyde test. In this paper they also describe a simple test for kala-azar in which one or two drops of blood are received into a small tube containing 2 per cent. potassium oxalate and then tested with 4 per cent. urea-stibamine solution in the ordinary way. The antimony test was done in 70 cases of kala-azar; all the results are reported as positive. Some, but by no means all, of these were proven cases of kala-azar. However, of the six cases in which the aldehyde reaction was negative and the antimony test positive, five had been definitely diagnosed by the finding of the parasite. The test was also tried in certain other conditions such as leprosy. Dr. Muir has investigated the aldehyde reaction in leprosy; he found that in a small percentage of cases the serum showed a certain degree of opacity, but he concluded by saying "the question of differential diagnosis between leprosy and kala-azar is not likely to arise." The serum of the most advanced case of leprosy seldom shows the complete opacity, even after standing for 24 hours; there is almost always some opalescence visible. Dr. Avari in Bombay and Dr. Muir in Calcutta have sent the present writer some of their "most positive" results and only on one or two occasions has he observed the completely opaque white-of-egg reaction. Even doubtful reactions occur only in clinically advanced cases of leprosy, so that, except that it makes it impossible by this test to diagnose concomitant kala-azar in a patient suffering from an advanced degree of leprosy, this is not a practical disadvantage of the aldehyde test. The fact that such a large number of positive results were obtained in so small a series of cases suggests that, in addition to the cases being selected ones, Col. Chopra did not adopt such a rigid standard for the positive reaction in reading the results of the aldehyde test as that laid down by the present writer. There is, however, no doubt that the antimony test gives a greater percentage of definitely negative reactions in leprosy than does the aldehyde test.

In the third paper these writers summarised their observations with the test over a period of some eight months, both in kala-azar and in other conditions. They reported having done the test in 256 cases of kala-azar; they only mention 34 of these as having been definite cases of kala-azar in which the diagnosis was made by finding the parasite. The diagnosis was, in the large majority of instances, made on clinical evidence combined with that of the serum tests, and was, therefore, in a number of instances actually dependent on the antimony test itself. During the period when these figures

were collected, Dr. C. R. Das Gupta, the clinical assistant to the present writer—who was at that time on leave—performed 46 spleen punctures on cases in which the antimony test was positive and the aldehyde test doubtful or negative; of these, 17 showed leishmania and 29 no leishmania in the smears. Experience has shown that the presence of the parasites can be demonstrated by the first spleen puncture in about 95 per cent. of cases of kala-azar, so that of the cases in which no parasites were found it seems certain that at least 26 were not, although clinically very like, cases of kala-azar.

The ætiology of the disease in these non-leishmanial cases with enlarged spleens is a distinct problem. As they are encountered in a kala-azar endemic area, Col. Chopra has suggested that perhaps they are really cases of kala-azar in which the parasites have died out or are very scanty.

The present writer (Napier, 1927a) has suggested that one of the sequelæ of kala-azar is a condition in which there is marked enlargement of the spleen, loss of weight, leucopœnia, and occasional bouts of low irregular fever; the aldehyde reaction is doubtful—there is sometimes a considerable degree of opacity, although not complete opacity—but parasites cannot be found even on repeated spleen puncture, or demonstrated by cultural methods. The 29 cases referred to above, in which no parasites were found, probably included some of the cases of this group; others were undoubtedly cases of chronic malaria.

Whatever the ætiology of these cases may be, the practical point is that they do not show the very slightest improvement on being treated by antimony in any form whatsoever, and it is essential that they should be differentiated from true, treatable cases of kala-azar.

Col. Chopra and his co-workers did not include these cases in the table in this paper because of the uncertainty about their ætiology and because they were not satisfied that they were not cases of kala-azar *sine* leishmania.

The aldehyde test in the diagnosis of kala-azar.—About 85 per cent. of the kala-azar patients who attend the out-patient department of the Calcutta School of Tropical Medicine give a definitely positive aldehyde reaction; as we know from performing spleen puncture in some thousands of such cases over a period of a number of years that very seldom does a patient not suffering from kala-azar give a definitely positive reaction, these patients are put on treatment with the feeling of certainty that at least 99 per cent. of them are cases of kala-azar.

On the other hand, it is usually possible to exclude a certain number of patients as being definitely not cases of kala-azar. The aldehyde reaction appears to become definitely positive about the 5th month of the disease in most cases. As histories are notoriously unreliable, we take the size of the spleen

as an indication of the length of duration of the disease. When the spleen is 4 inches below the costal arch the aldehyde reaction should be definitely positive; therefore, allowing a margin, we assume that all patients whose spleens are 6 inches or more below the costal margin and whose aldehyde reaction is not definitely positive are *not* cases of kala-azar, and again experience has shown that very rarely is this assumption wrong.

It will be seen that by means of the aldehyde test a definite diagnosis can be made in the majority of cases of kala-azar (of the class seen in the out-door department of this institution), and that in a percentage of cases of other diseases clinically simulating kala-azar, a definitely negative diagnosis can also be made. There still remains a group of cases in which other diagnostic methods must be applied.

By applying this rule to these 46 "doubtful" cases in which a spleen puncture was done, referred to above, 8 could have been excluded as being definitely not cases of kala-azar, as the spleen was 6 inches or more below the costal margin; in none of these were parasites demonstrated.

It is thus seen that, whereas the antimony test failed to differentiate this doubtful group—in 60 per cent. of which the parasite was not demonstrated—from the true kala-azar cases, by means of the aldehyde reaction, not only were these cases selected for further investigation, but a certain number of them could be weeded out as definitely *not* cases of kala-azar.

There is no doubt whatsoever that a positive result is obtainable at a much earlier stage in the disease with the antimony test than with the aldehyde test, nevertheless the former test does not always give a positive or even doubtful result during the first few weeks of the clinical manifestations of the disease.

Col. Chopra and his co-workers lay emphasis on the fact that the reaction occurs constantly after the 15th day of the disease. The fixing of the day of onset is very difficult, as patients obviously in an advanced stage of the disease often state that they have only been ill for a few days; it is therefore advisable, as already suggested, to take the degree of splenic enlargement also as an indication of the duration of the disease.

The dilution method.—After Col. Chopra made the original observation that the serum of kala-azar patients was precipitated by certain solutions of the pentavalent compounds of antimony, the present writer worked out a technique for applying this phenomenon to the diagnosis of kala-azar; recognising the fact that when the strong (4 per cent.) solution of antimony was added to undiluted serum a positive reaction was liable to occur in conditions other than kala-azar, he suggested the use of weaker solutions of the antimony preparations. He applied this test to

some 60 sera of which 44 were from cases of kala-azar diagnosed by spleen puncture and was able to show that the results compared quite favourably with those of the aldehyde reaction.

Col. Chopra also recognised the danger of these "false positive" results in the antimony test and introduced the dilution method in which the serum is diluted 8 to 10 times with distilled water and then tested in the ordinary way with 4 per cent. antimony solution.

The present series.—There has been a certain amount of misunderstanding about this test, mainly because many of the persons who have used it have neither followed Col. Chopra's technique carefully enough nor realised sufficiently the limitations of the test.

On his return from leave, the present writer felt that some of these misunderstandings might be cleared up if he examined the blood of a series of cases, using Col. Chopra's three methods and the aldehyde test, and confirmed the diagnosis in as many cases as possible by spleen puncture. The antimony test, the dilution modification and the aldehyde test were performed by the present writer, but in every instance the results of the two former tests were read by Col. Chopra, Dr. Gupta or Dr. Basu, usually the first-named, and their readings only are used in this paper. The tests were carried out over a period of about five months, from December to May; the patients were seen in the kala-azar out-patient department of the Calcutta School of Tropical Medicine and many of them were subsequently admitted to the Carmichael Hospital for Tropical Diseases for treatment. Spleen puncture was performed as a routine measure in the hospital if parasites were not previously found in the peripheral blood, but in the out-patient department only in those cases in which there was any real doubt about the diagnosis. Thus, if both aldehyde and antimony tests were strongly positive, or if on the other hand they were both negative and there was no clinical reason to suspect kala-azar, a puncture was not usually done. Another group of patients in which a puncture was not done consisted of those who did not attend a second time. So that out of a total of about 400 patients who attended the department a puncture was done in only 165 cases. In 98 instances in which the antimony and aldehyde tests were both strongly positive, a puncture was not done; these were almost certainly all cases of kala-azar.

In more than half the cases a culture was also done at the same time and in only two instances was the culture "positive" when a direct examination of the smears was "negative." This confirms previous observations that in at least 95 per cent. of cases of kala-azar the first spleen puncture smear shows the presence of leishmania.

Tables I and II show the results of the aldehyde and two antimony tests in the 165 cases in which a definite diagnosis was made.

TABLE I.
Leishmania demonstrated.

ALDEHYDE TEST.		ANTIMONY TEST.			
Read- ing.	Num- ber.	Reading.	Ordinary.	Dilution.	
Positive readings.	+++	+++	20	17	
		++	2	..	
		++	11	12	
		±	..	4	
		-	..	1	
	++	Not done	1	..	
		+++	4	2	
	+	++	1	3	
		+++	10	1	
		±	5	11	
Doubtful readings.	(+) 19	+++	5	6	
		++	11	5	
		±	3	4	
		-	0	4	
		+++	4	5	
± 18	++	1	..		
	++	9	3		
	±	2	3		
	-	2	7		
	±	2	7		
Negative readings.	(-) 3	+	3	1	
		±	0	1	
		-	0	1	
	-ive 4	+	..	1	
		±	2	..	
Not done		-	2	3	
Not done		+	1	1	
Totals ..		100	..	100	100

The aldehyde test.—The technique used for this test is that suggested originally by the present writer (Napier, 1922); 1 cubic centimetre of serum is placed in a small test-tube (4 inches \times $\frac{1}{2}$ inch) and a drop of commercial formalin is added. The readings are taken as follows:—

Positive results.—The serum becomes solid and completely opaque within 20 minutes = +++.

The serum becomes solid and completely opaque within 2 hours = ++.

The serum becomes solid and completely opaque within 24 hours = +.

Doubtful results.—The serum becomes solid and markedly opalescent but not completely opaque within 24 hours = (+).

The serum becomes solid and slightly opalescent within 24 hours = ±.

Negative results.—The serum solidifies but remains clear = (-).

The serum remains fluid and clear = -ive.

Results in this series.—The test was positive in 57 cases; of these 55 were shown to be cases of

TABLE II.
Leishmania not demonstrated.

ALDEHYDE TEST.		ANTIMONY TEST.				
	Read- ing.	Num- ber.	Reading.	Ordinary.	Dilution.	
Positive readings.	++	1	{ ++ + + + ±	1	..	
	+	1		..	1	
Doubtful readings.	(+)	19		++ +	7	3
				+ +	2	..
				+ +	7	7
			± ±	2	4	
			-	1	5	
	±	18	+ + +	1	1	
			+ +	4	..	
			+ +	5	2	
			± ±	5	4	
			-	3	11	
Negative readings.	(-)	13	+	4	3	
			±	3	1	
			-	6	9	
	-ive	13	+ + +	1	1	
			+ +	2	1	
			± ±	4	..	
TOTALS ..		65	..	65	65	

kala-azar and one of the two cases in which parasites were not found had received a certain amount of treatment. So that for all practical purposes one can conclude that in an untreated patient a positive reaction indicates kala-azar.

In 74 instances the result was doubtful; of these 37, that is just half, were cases of kala-azar.

In 33 instances the result was negative; of these 7, that is 21 per cent., were cases of kala-azar.

Now it has never been claimed for the aldehyde reaction that it could be used for making a "negative" diagnosis, except in a few instances of marked splenic enlargement, as there are other methods available. The main merit of the aldehyde test is that by applying it a very large number of kala-azar cases can safely be selected for treatment without further investigation.

If, however, it is desirable to reduce the number of doubtful cases still further, this can be done at the risk of making a small percentage of wrong diagnoses. For this purpose the length of duration of the disease and the degree of splenic enlargement must be taken into consideration. In the following table, the cases have been grouped according to their splenic enlargement.

TABLE III.
Aldehyde test results and splenic enlargement.

Group.	Reading.	Leish- mania present.	Leish- mania not present.	Total.
"A"	+++	9	0	9
Spleen less than	++	1	1	2
3 inches	+	5	1	6
below costal	(+)	4	4	8
margin.	±	10	7	17
	(-) or -ive	6	10	16
	not done	1	..	1
"B"	+++	14	0	14
Spleen	++	4	0	4
3 inches	+	8	0	8
or more, but	(+)	12	7	19
less than 6	±	7	3	10
inches	(-) or -ive	0	12	12
below costal				
margin.				
"C"	+++	11	0	11
Spleen 6	++	0	0	0
inches or	+	3	0	3
more below	(+)	3	8	11
costal	±	1	8	9
margin.	(-) or -ive	1	4	5
TOTALS ..	..	100	65	165

TABLE IV.
The aldehyde test results and duration of disease.

Group.	Reading.	Leish- mania present.	Leish- mania not present.	Total.
"A"	+++	3	0	3
History of	++	1	0	1
duration of	+	2	0	2
3 months	(+)	10	1	11
or less.	±	14	5	19
	-	6	7	13
"B"	+++	12	0	12
History of	++	3	0	3
duration of	+	10	1	11
more than	(+)	6	12	18
3 months, but	±	4	6	10
less than	-	1	12	13
1 year.				
"C"	+++	18	0	18
History of	++	1	1	2
duration	+	3	0	3
of 1 year	(+)	3	5	8
or more.	±	0	7	7
	-	0	7	7
TOTALS	97	64	161

Aldehyde test not done .. 1
Duration not noted .. 3

It will be seen that in group "A" (spleens less than 3 inches) a negative result is of little value—of the 16 cases in which it occurred, 6 were cases of kala-azar—but in the other two groups out of 17 negative results, only one was in a case eventually diagnosed as kala-azar. In the first two groups a "doubtful" diagnosis gives little indication of the nature of the case, but in group "C" (6 inches or more) it suggests that the case is probably *not* one of kala-azar—in only 4 cases out of 20 was the parasite found. Thus a "negative" diagnosis can be made by means of the aldehyde test in an additional 37 cases with an error of 5. Or applying the rule to the corresponding groups in Table IV (duration of disease), a "negative" diagnosis can be made in an additional 35 cases with an error of 4.

By classing "negatives" in group "A" as doubtful, and "doubtfuls" in group "C" as negative, the diagnostic results summarised in the two following tables are obtained:—

TABLE III(a).

	Agree with pro- tozoological find- ings, i.e., correct.	Disagree, i.e., prob- ably incorrect.	Doubtful.
Less than 3 inches ..	15	2	41
3 inches but less than 6 inches	38	0	29
6 inches or more ..	34	5	0
TOTALS ..	87*	7	70

* These figures can be accepted for purposes of comparison with the antimony test, but they do not show up the aldehyde test in the best light, i.e., as stated above, more than half the cases in this series were selected *because* the aldehyde reaction was doubtful. The cases in this series in which there is a positive aldehyde reaction are those in which parasites were found in the peripheral blood or in which the patient was admitted to hospital. Amongst the out-patient population we diagnose more than 80 per cent. by means of the aldehyde test alone.

TABLE IV(a).

	Agree with pro- tozoological find- ings, i.e., correct.	Disagree, i.e., prob- ably incorrect.	Doubtful.
3 months or less ..	6	0	43
More than 3 months but less than a year. ..	37	2	28
1 year or more ..	41	4	0
TOTALS ..	84	6	71

The antimony test.—The technique used in this test is that suggested by Chopra and his co-workers. Separated serum is placed in a fine glass tube, about 0.5 c.cm. calibre, sealed at one end; this is placed in a small rack, or more conveniently stuck in a tray of plasticine, and 4 per cent. urea-stibamine is added slowly by means of a Wright's pipette. The solution should not be added too slowly as a certain amount of mixing at the junction of the fluids is desirable; on the other hand, they should not be intimately mixed. The sera are grouped as follows:—

"(1) *Strongly positive sera* (+++). The precipitate here forms immediately and is thick and flocculent. The precipitate conglomerates into a thick mass, generally at the junction of the serum and antimony solution and is difficult to break by shaking the tube. The precipitate is insoluble and will not dissolve if the tube is kept for 24 hours or longer.

"(2) *Positive sera* (++ or +). In this class are included those sera in which a definite flocculent precipitate forms, but the precipitate is not so thick as in the first group..... In this class the precipitate is obviously flocculent..... The precipitate has the same tendency to collect together into a mass at the junction of the two fluids, though the mass is not so thick. The precipitate sometimes settles at the bottom of the tube and is quite insoluble after 24 hours.....

"(3) *Doubtful sera* (±). Under this category come the sera in which definite precipitate, or in some cases varying degrees of haziness, appears at the junction of the two fluids. The precipitate or haziness, however, has not a flocculent character. If the tubes are allowed to stand for a few hours sometimes the precipitate entirely dissolves. In other cases the precipitate still remains, even after 24 hours.

"(4) *Totally negative sera* (—). In this group are included those sera in which no precipitate whatever is formed and there is not even the slightest haziness at the junction of the two fluids."

For the sake of convenience in most of the tables only two groups of positive results are given, namely, strong positive +++, and weak positive or +, the ++ readings being included in the latter group.

The brand of urea-stibamine used in the first few tests was Stiburea of the Union Drug Co., but later, as Col. Chopra was of the opinion that it gave more consistent results, Urea-stibamine (Brahmachari) was used as well, the tests being done in duplicate in most instances. A glance at Table V will show that there is little to choose between the two preparations; the latter gives a slightly higher percentage of positive readings in both groups of cases, but the results are not more specific.

We have used for this analysis the Urea-stibamine (Brahmachari) results; except in the few instances in which Stiburea only was used; that is to say, the results analysed are the sum of columns 2 and 7 in Table V. These results are summarised in Table VI.

TABLE VI.

Summary of antimony test results.

Result.	Reading.	Leishmania present.		Leishmania not present.		
Positive .	+++ ++ +	43 3 41	} 87	10 6 19	} 35	
Doubtful ..	±			8		.. . 14
Negative ..	—			4		.. 16
Not done			1	.. ..	
TOTALS	100	..	65	

The result of the test was positive in 122 cases; of these 87 were cases of kala-azar and in 35 parasites were not found.

The result was doubtful in 22 cases; of these 8 were kala-azar and 14 probably not kala-azar.

TABLE V.

Antimony test results with different brands of urea-stibamine.

	2		3		4		5		6		7	
	Stiburea (Union Drug) only.		Urea-stibamine (Brah.) only.		BOTH BRANDS.				TOTALS.			
					Stiburea.		Urea-stibamine.		Stiburea.		Urea-stibamine.	
Leishmania	+	-	+	-	+	-	+	-	+	-	+	-
Reading												
+++	7	2	7	3	26	3	29	5	33	5	36	8
++	2	..	..	..	1	4	1	6	3	4	1	6
+	7	3	7	4	26	9	27	12	33	12	34	16
±	1	5	2	1	6	14	5	8	7	19	7	9
-	1	1	1	3	5	13	2	12	6	14	3	15
TOTALS ..	18	11	17	11	64	43	64	43	82	54	81	54

The result was negative in 20 cases, of which 4 were cases of kala-azar.

Summing these results we find that by this test a correct diagnosis was made in 103 or 62.8 per cent. cases, a doubtful one in 22 or 13.4 per cent., and an incorrect diagnosis in 39 or 23.8 per cent. cases.

These figures and percentages are based on the assumption that one spleen puncture reveals the presence of parasites in every case of kala-azar in which it is performed. Now this is not so. As we have stated above, it is positive in only about 95 per cent. of cases, so that, had no culture been done in any instance, we should have to allow for the addition of another 5 cases of kala-azar in which the first spleen puncture was negative; as, however, a culture was done in about half the cases, an allowance of three for the imperfection of spleen puncture as a diagnostic measure will be ample. This will mean an addition of three to the correct results and a deduction of three from the incorrect results, making the final results:—

Correct diagnosis in 106 or 64.6 per cent. cases.

Incorrect diagnosis in 36 or 21.9 per cent. cases.

Doubtful diagnosis in 22 or 13.4 per cent. cases.

The unsatisfactory point about this table is the very large number of incorrect diagnoses. A diagnostic method which gives one misleading

result for every three correct ones, in a disease in which more exact methods are available, does not at first sight appear to be of much practical value.

If, however, the size of the spleen and the length of duration of the disease be taken into consideration by excluding certain groups of cases the number of incorrect diagnoses can be considerably reduced, although, of course, this procedure will effect a reduction in the number of correct diagnoses also. In the Table VII the cases are grouped according to the splenic enlargement.

The first thing that is obvious when this table is examined is that the standards for "positivity" must be adjusted; only "strongly positive" reactions should be considered as indicating kala-azar, "weak positives," indicated by $+$, should be classed as doubtful. This will reduce the number of positive reactions to 53, of which 43 were in proved cases of kala-azar. Further, by excluding all cases of group "C" (in which the spleen is 6 inches or more below the costal margin) the positive results are reduced to 33, of which 30 are definitely proven cases of kala-azar.

From the point of view of making a negative diagnosis, if group "A" cases (in which the spleen is less than 3 inches below the costal margin) be excluded and both \pm and $-$ results be considered as "negative," then a negative diagnosis can be made in 18 cases with an error of only 1. Thus we have:—

TABLE VII.

Antimony test results and splenic enlargement.

Group.	Reading.	Leishmania present.	Leishmania not present.	Total.
"A" Spleen less than 3 inches below costal margin.	+++ ++ or + \pm — Not done	12 12 7 4 1	1 9 5 8 ..	13 21 12 12 1
"B" Spleen 3 inches or more, but less than 6 inches below costal margin.	+++ ++ or + \pm —	18 26 1 0	2 10 3 7	20 36 4 7
"C" Spleen 6 inches or more below costal margin.	+++ ++ or + \pm —	13 6 0 0	7 6 6 1	20 12 6 1
TOTALS ..	..	100	65	165

TABLE VII(a).

	Agree with protozoological findings, i.e., correct.	Disagree, i.e., probably incorrect.	Doubtful.
Group "A" less than 3 inches	7	0	32
"B" 3 inches to 6 inches	28	3	36
"C" 6 inches or more	12	1	45
TOTALS ..	47	4	113

In the following table the cases are grouped according to the length of duration of the disease.

If only "strongly positive" reactions are considered as indicating kala-azar and all cases of group "C" (in which the disease has lasted for a year or more) are excluded, there are 31 "positive" results with 6 errors. And if for the negative diagnosis \pm and $-$ results in groups "B" and "C" only be taken, there are 26 "negative" results with 5 errors.

TABLE VIII.

Antimony test results and duration of disease.

Group.	Reading.	Leishmania present.	Leishmania not present.	Total.
"A" History of duration of 3 months or less.	+++ ++ or + ± —	8 20 3 4	1 3 5 4	9 23 8 8
"B" History of duration of more than 3 months but less than 1 year.	+++ ++ or + ± —	17 16 4 0	5 13 6 7	22 29 10 7
"C" History of duration of 1 year or more.	+++ ++ or + ± —	16 8 1 0	4 8 5 5	20 16 4 5
TOTALS ..	..	97	64	161
Antimony test not done		..	1	
Duration not noted		..	3	

Thus we have:—

TABLE VIII(a).

	Agree with protozoological findings, i.e., correct.	Disagree, i.e., probably incorrect.	Doubtful.
Group "A" 3 months or less.	8	1	39
Group "B" more than 3 months, but less than 1 year.	30	9	29
Group "C" 1 year or more	8	1	36
TOTALS ..	46	11	104

It is obvious that much more satisfactory results are obtainable by taking into consideration the splenic enlargement rather than the duration of the disease according to the statement of the patient.

The dilution method.—The technique for this test is exactly the same as for the original test, except that dilute serum is used. The serum is diluted with nine parts of distilled water; it is then placed in a small test-tube and the 4 per cent. urea-stibamine is added. Except in the first 29 cases, the Brahmachari brand was used. The results are read as follows:—

A heavy flocculent precipitate = +++ or strongly positive.

A fine flocculent precipitate = + or positive.

A homogeneous cloud without flocculi = ± or doubtful.

No change in the mixture = — or negative.

The readings are shown in Table IX.

TABLE IX.

Summary of dilution method results.

Result.	Reading.	Leishmania present.		Leishmania not present.	
Positive ..	+++	31	} 68	5	} 19
Doubtful ..	+	37		14	
Negative ..	±		13		10
Not done ..	—		18		36
TOTALS	100	..	65

The test was "positive" in 87 cases; of these 68 were cases of kala-azar and in 19 the parasite was not demonstrated. It was doubtful in 23 cases, of which 13 were cases of kala-azar and 10 probably not. And it was negative in 54 cases, of which 18 were cases of kala-azar.

Summing these results we see that by this test a correct diagnosis was made in 104 cases or 63.4 per cent., an incorrect diagnosis in 37 cases or 22.6 per cent., and a doubtful one in 23 cases or 14.0 per cent.

Here again the number of incorrect diagnoses is much too great for the test, in this form, to be of any practical value.

In Table X the results are grouped according to splenic enlargement.

TABLE X.

Dilution method results and splenic enlargement.

Group.	Reading.	Leishmania present.	Leishmania not present.	Total.
"A" Spleen less than 3 inches below costal margin.	+++ ++ ± —	6 12 7 11	0 4 5 14	6 16 12 25
"B" Spleen 3 inches or more but less than 6 inches below costal margin.	+++ ++ ± —	15 17 6 6	1 4 3 14	16 21 9 20
"C" Spleen 6 inches or more below costal margin.	+++ ++ ± —	10 8 0 1	4 6 2 8	14 14 2 9
TOTALS	99	65	164

Test not done

.. 1

Again it is obvious that only +++, i.e., "strongly positive," reactions must be considered as indicating kala-azar and that in group "C" all positive reactions must be ignored. This will mean that a positive diagnosis is made in 22 cases with an error of only 1. A "negative" diagnosis can be made only in group "C" where ± or — reactions may be looked upon as negative results; under these conditions, 11 diagnoses would be made with a single error. Summing these results we have:—

TABLE X(a).

	Agree with protozoological findings, i.e., correct.	Disagree, i.e., probably incorrect.	Doubtful.
Group "A" less than 3 inches.	6	0	53
Group "B" 3 inches less than 6 inches.	15	1	50
Group "C" 6 inches or more.	10	1	28
TOTALS ..	31	2	131

Thus by this method the degree of accuracy in diagnosis is very satisfactory, although the number of cases in which a diagnosis can be made is low. Actually the results of this test are more satisfactory than the figures indicate, as Col. Chopra and his colleagues did not always distinguish between "positive" and "strongly positive" reactions, and wrote the word "positive" or the sign + when the reaction was really very marked indeed. The necessity of distinguishing between these two types of reaction is quite evident if Table X be perused.

In Table XI the results are arranged according to the history of the duration of the disease. Satisfactory results cannot be obtained by applying the same rule to the figures in this table.

The Blood Test.—The technique of this test devised by Chopra, Gupta and Basu (1927) is as follows:—

"All that is required are a 2 per cent. solution of potassium oxalate, a 4 per cent. solution of a urea-antimony salt such as urea-stibamine, two small test-tubes and a few Dreyer's tubes, which simply consist of 2-inch pieces of glass tubing 3 to 4 mm. in diameter sealed at one end. . . . One or two drops of blood obtained from a finger pricked with a needle are allowed to mix well with about 0.25 c.c. of a 2 per cent. solution of potassium oxalate. . . .

A little of this solution is transferred into a Dreyer's tube and a 4 per cent. solution of the antimony compound is added by means of a capillary pipette along the side of the tube. The heavy antimony solution sinks to the bottom, and in cases of kala-azar a flocculent precipitate

forms almost immediately at the junction of the two fluids. This precipitate soon settles down at the bottom of the tube with the red corpuscles entangled in it."

TABLE XI.

The dilution method results and duration of disease.

Group.	Reading.	Leishmania present.	Leishmania not present.	Total.
"A" History of duration of 3 months or less.	+++ ++ ± —	8 12 6 10	1 1 2 9	9 13 8 19
"B" History of duration of more than 3 months, but less than 1 year.	+++ ++ ± —	11 14 4 7	2 9 6 14	13 23 10 21
"C" History of duration of 1 year or more.	+++ ++ ± —	11 10 3 1	2 3 2 13	13 13 5 14
TOTALS	97	64	161

Test not done .. 1
Duration not noted .. 3

The blood was taken in the out-patient department and dropped into oxalate solution; this mixture was then handed over to Col. Chopra's department where the tests were performed. At first the blood was dropped from the syringe but later, as the results were unsatisfactory, at Col. Chopra's suggestion the blood was taken from the finger. Two different sets of figures are given. The test was only done in 104 cases in which the spleen puncture had been done, so in addition a series "probable cases of kala-azar" are included; these are cases in which both the aldehyde reaction and the antimony test are definitely positive, and were almost certainly cases of kala-azar.

Table XII gives the results of these tests.

Thus, out of 45 patients who were almost certainly not suffering from kala-azar 27 gave a "positive" blood test, and of the 8 patients who gave a "negative" blood test 4 were certainly cases of kala-azar, whilst a fifth was also probably suffering from this disease.

It is apparent that whichever method is used, the results of the blood test are entirely unsatisfactory.

It is only fair to state that although the above-mentioned writers suggested this test, they did not make any claims as to its specificity.

Diagnostic value of combined results.—Col. Chopra has pointed out that the two tests,

TABLE XII.
Blood test: Summary of results.

Result.		Kala-azar.	Probably kala-azar.	Probably not kala-azar (no leishmania).
Positive, +++ or +	Finger blood	19	29	15
	From vein	20	17	12
	TOTALS..	39	46	27
Doubtful, ±	Finger blood	10	19	8
	From vein	6	3	7
	TOTALS..	16	22	15
Negative, -ive.	Finger blood	3	0	2
	From vein	1	1	1
	TOTALS..	4	1	3
GRAND TOTALS		59	69	45

SUMMARY.

Probably correct diagnosis	=	88	or	50.9 %
Probably wrong diagnosis	=	32	or	18.5 %
Doubtful diagnosis	=	53	or	30.6 %
TOTAL ..		173		

i.e., the antimony test and the dilution method, should not be considered separately, but that a diagnosis should be made on the combined results of the two tests. It will be necessary, in order to eliminate the large number of incorrect results which would be obtained if a positive result were taken as indicating kala-azar, to take the patient's condition into consideration and to adjust the standards of positivity as has been done in the separate reading of the tests. The most satisfactory division of the patients is, as has been shown above, according to the size of the spleen. The following rules for making a positive and a negative diagnosis, respectively, are suggested.

Positive diagnosis.—All cases of groups A and B in which the result of the antimony test is +++, and of the rest any case in any group in which the dilution method is +++.

Negative diagnosis.—All cases of groups B and C in which the result of the antimony test is doubtful or negative, i.e., ± or —, and of the remainder in group C any case in which the result of the dilution method is ± or —.

By applying these rule the following results are obtained:—

	Total.	Agree.	Disagree.
Positive diagnosis ..	57	50	7
Negative diagnosis ..	23	21	2
Doubtful ..	85	..	..
Total ..	165	71	9

SUMMARY AND CONCLUSIONS.

THE ANTIMONY TEST.

The antimony test is a much more delicate test than the aldehyde test, that is to say it is positive at a much earlier date in the disease, but it is not positive in every case of kala-azar; in this series the test was entirely negative in 4 instances and "doubtful" in 8 others.

The changes occurring in the serum of a kala-azar patient, which are indicated by a positive antimony test result, also occur to a less extent in the serum of patients suffering from certain other diseases, such as chronic malaria and certain other conditions of splenic enlargement, phthisis and leprosy, therefore this delicacy of the reaction is a distinct disadvantage; in 35 instances in this series the result of the test was positive in cases in which the parasite was not demonstrated by spleen puncture.

For the test to be made one of clinical value, it is essential that the standards of "positivity" should be readjusted and that the condition of the patient should be taken into consideration; for this purpose the following rule is suggested:—

A positive diagnosis.—This should be made only in cases in which the spleen is less than 6 inches below the costal margin and in which there is a strongly positive reaction, that is to say, a reaction in which a solid plug of coagulum forms at the junction of the two fluids, which plug is not moved when the tube is tilted and is dislodged only by violent agitation.

A negative diagnosis.—This should only be made by means of this test in cases in which the spleen is 3 inches or more below the costal margin and in which the serum remains quite clear or becomes cloudy but without showing definite flocculation.

THE DILUTION METHOD.

This test is much less sensitive; in this series in 18 cases of kala-azar it was entirely negative and in 13 others it was doubtful.

This lack of sensitiveness is the distinct advantage in that the test is less frequently positive in conditions other than kala-azar; in this series it was strongly positive only in 5 cases in which the parasite was not demonstrated by spleen puncture.

Again, in the case of this test it is necessary to readjust standards and to take the condition of the patient into consideration; for this purpose the following rule is suggested:—

A positive diagnosis.—This should be made only in cases in which the spleen is less than 6 inches below the costal margin, and in which there is a strongly positive reaction, that is to say, in which a heavy flocculent precipitate forms.

A negative diagnosis.—If the spleen is 6 inches or more below the costal margin and the reaction is negative or doubtful, that is, one in which there is no definite flocculation.

THE DOUBLE TEST.

By means of either of these tests, although the error is small, in only a small percentage of cases can a definite diagnosis be made, but by doing both tests and taking both readings into consideration, as well as the size of the patient's spleen, a diagnosis can be made in a much larger number of cases with only a slight increase in the possible error. The following rule is suggested:—

A positive diagnosis.—This should be made when the antimony test is strongly positive in cases in which the spleen is less than 6 inches below the costal margin, or in any case in which the dilution method gives a strongly positive reaction.

A negative diagnosis.—This should be made when the antimony test is negative or doubtful in any case in which the spleen is 3 inches or more below the costal margin, or when the dilution method gives a negative or doubtful reaction in any case in which the spleen is 6 inches or more below the costal margin.

The blood test.—The results obtained here indicate that the test is of no value as a diagnostic method in kala-azar.

My thanks are due to Col. Chopra and his colleagues for their whole-hearted co-operation throughout this investigation, and also to my assistant Dr. C. R. Das Gupta.

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MALARIA AS A CAUSE OF CATARACT.

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ONE would expect in a country like India, where malaria is so prevalent, that cases of cataract with malaria as a causation would be common. In looking up as far back as 1919 the ophthalmological literature of the ocular complications of malaria, I am unable to find any case of cataract with malaria as a cause.

Conditions ascribed to malaria and due to the intense sun, dust, heat and general diseases are

as common in tropical regions where malaria infection is not usual as where malaria is rife.

Elliott in his book "Tropical Ophthalmology" discusses the ocular complications, but no mention is made of malaria as a cause.

Among 12,000 cases of malaria, Manson found that after practically every attack a slight icteric tinge of the conjunctiva was visible in the lower retrotarsal fold and extending on to the bulbar conjunctiva. Of the sequelæ of malaria, dendritic ulceration of the cornea is most frequent, although it is not very common. It is never seen with the primary attack, but appears after from 20 to 50 paroxysms. Intra-ocular hæmorrhage he found very rare, only 2 cases among the 12,000. Both of these were of the malignant tertian type and in one of them both eyes were affected. He saw 3 cases of ocular motor nerve lesions after definite malarial attacks, in men previously healthy and free from syphilis.

Pereyra reports several cases of hæmorrhagic retinitis in malaria; this he states is a frequent complication, mainly in the quartan type and less frequently in the tertian. The hæmorrhages were caused by direct lesion of the retinal vessels by the malarial toxins, leading to an abnormal permeability and indirect lesion through thrombosis of the choroidal vessels.

Kiep in Macedonia during 1916—1918 found 10 cases of retinal and pre-retinal hæmorrhages, which he assumed were due to occlusion of the retinal capillaries by plasmodia.

During the epidemic in Omak in 1924, Adrianoff examined the eyes of 428 cases of malaria. In these cases were found peculiar silverwhite bands in the region of the macula along the blood vessels. In one case, there were opacities of the vitreous and remnants of pigment on the anterior capsule of the lens. Seven cases had dendritic keratitis, one neuralgia of the left trigeminal nerve, one severe plastic uveitis and one bilateral optic neuritis.

Most authors seem to agree that the most frequent lesion of malaria is *herpes corneæ* and that retinal hæmorrhages, either sub-hyaloid or flame-shaped, are common.

From a large clinical experience of darkroom work in India, I can say that there is no characteristic fundus condition which can be ascribed to malaria. Recently, I have come across the following three cases of cataract which appear to me to be due, undoubtedly, to malaria.

Case I.—Mrs. U. B. P., age 38 years, European.

History.—The patient has been residing in Bengal for a period, off and on, of 10 years. In 1922 she resided in a very malarious district and had many severe malarial attacks, lasting over a period of seven months. The attacks were resistant to quinine treatment by the mouth but were controlled by quinine injections. In March 1923, she first noticed that her vision had begun to fail and had very gradually become worse.

Physical Examination.—When seen by me in March 1928 the vision in the right eye was 6/18, in the left eye 6/24. Cornea normal, no keratic precipitates, pupils equal and regular, vitreous normal. The fundi showed no abnormality. Fields normal. With a dilated pupil the lens of both eyes showed well marked striæ

of the cart-wheel pattern, principally in the anterior cortical layer. There were also small opacities in the posterior cortical layer. The patient was in good health and not anæmic. The urine contained no albumen or sugar and there was no evidence of lues, no oral sepsis and no evidence of intestinal trouble. There was no family history of hereditary cataract. The patient complained of very bad headaches, especially after close work.

I saw her again six months later. The vision was still the same and the opacities in the lens had not increased. The patient was in good health and has had no further attacks of malaria.

Case II.—Mr. R. R. K., age 21 years, Indian.

History.—Dim vision in the right eye for one year. He is a resident of a very malarious district in Bengal and has a long history of attacks of malaria occurring for the last five years. The attacks yield to quinine treatment.

Physical Examination.—The patient is a well nourished man, not anæmic. His spleen is enlarged two inches below the costal margin. The urine contains no albumen or sugar, the teeth are good, the Wassermann reaction is negative. No evidence of intestinal disease. No history of trauma.

Vision in the right eye, finger movements only; vision in the left eye, 6/6. Right eye cornea normal. No keratic precipitates. Pupil active and regular. The lens, mature cataract. Left eye, normal. The lens showed no opacities.

The patient was operated on on the 27th April, 1928, capsulotomy with button-hole iridectomy, and was discharged from the hospital on the 18th May, 1928, when the vision in the right eye corrected with glasses was 6/12. The fundus showed no abnormality.

The case is an interesting one as the cataract was a monocular juvenile one and the only causation can be ascribed to malaria. Juvenile cataract is not uncommon in Bengal and the greater number of cases are due to syphilis.

Case III.—Mrs. J. R. L., age 45 years, European.

History.—The patient has been residing in Orissa, India, for a period, off and on, of 12 years. During this time, she has lived in a malarious district and has suffered from many attacks of malaria. She states that every year she suffers from malaria and has been accustomed to take large doses of quinine. Since 1925, her vision has begun to fail in both eyes and has gradually become worse.

Physical Examination.—When seen by me in November 1927 the vision in the right eye was 6/12, in the left eye 6/24. Cornea normal, no keratic precipitates, pupils equal and regular. With a dilated pupil, the lens of both eyes showed peripheral striae. There was a large central opacity in the left lens with a less marked central opacity in the right lens. The opacities were principally in the anterior cortical layer and there were smaller opacities in the posterior cortical layer. The fundi showed no abnormality. The patient was again seen by me in September 1928. She stated that she was still suffering from attacks of malaria which were controlled by quinine. The spleen was enlarged and palpable. The vision in the right eye was 6/9; left eye, 1/60. The cataract in the left eye was mature and the patient was advised operation. Her general condition was good and she was not anæmic. The urine contained no albumen or sugar, there was no evidence of lues, no oral sepsis and no history of intestinal trouble. No family history of hereditary cataract.

REMARKS ON THE OPERABILITY AND OPERATIVE TECHNIQUE OF VESICO-VAGINAL FISTULA.*

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At the Seventh Congress of the Far Eastern Association of Tropical Medicine held in

*Read at the September Meeting of the Calcutta Branch of the British Medical Association.

Calcutta in December 1927, Miss Scudder of Vellore, Madras, initiated a discussion on vesico-vaginal fistula and stated, as far as I remember, that she obtains about 80 per cent. recoveries after operations. I remarked at the meeting, that my impression was that it was not possible to get such results in Calcutta, from the type of case we get here.

In 1908, I reported a case of Cæsarean hysterectomy on a patient with an irreparable vesicovaginal fistula before the obstetric section of the Royal Society of Medicine.

At the discussion which followed, the President, Dr. Herbert Spencer thought that in the case reported by me "the vesicovaginal fistula should have been operated on and would have been cured by the author, who had successfully closed the rectovaginal fistula, the operation for which was not so successful as that for vesicovaginal fistula, which he thought could always be cured." Dr. Amand Routh "thought that the only way that Dr. Das could have cured the vesicovaginal fistula would have been to dissect off the bladder from its connections and draw it down into the vagina as an empty sac."

The above remarks led me to analyse the cases that have come under my observation up-to-date with a view to determine the feasibility of successfully closing these fistulae in every case. The case which I reported was so remarkable that the following brief summary will interest you.

The patient came under my care in the Campbell Hospital in October 1906, with the following conditions:—"The whole base of the bladder has apparently sloughed away. There is a chink representing the os externum, at the upper margin of the rent. The posterior wall of the vagina is represented by a small band of cicatricial tissue. The perineum is deficient, but the sphincter ani is not torn. Above the intact sphincter, there is a rectovaginal fistula about 1½' long. To begin with, I performed an operation for the repair of the rectovaginal fistula, with complete success. The next step was to attempt the repair of the vesicovaginal fistula. This was found impossible owing to absence of any healthy tissue in the neighbouring area. I then decided to close the vagina, but owing to the absence of any healthy tissue around the vaginal outlet, extension of the perineum to the desirable extent was not possible. I then decided to dissect the urethra and to bring it down to the posterior margin of the extended perineum so that the meatus urinarius was brought down to a lower level and a deeper plane. The effect of the operation was that the extended perineum acted as a flap valve and helped to retain the urine in the cloaca for a certain time with the help of a very slight pressure on the parts with a pad.

The patient remained in the hospital for about six months, but was naturally losing patience and took her discharge. She, however, came back after a month with some of my work undone. It appears that she went to another hospital, where as the result of examination, the anterior portion of the extended perineum was torn. I extended the perineum again and she left hospital in an ameliorated condition.

I lost sight of her for about two years, after which period she came to the hospital with amenorrhœa of four months duration and a swelling in the lower abdomen and to my surprise, I found that she was pregnant. An examination of the vulva revealed that the skin round the small opening of the cloaca had radiating folds, like those round the anal orifice, giving the impression of some sphincteric action. A pad over

the vulva kept her dry for about an hour. She got herself readmitted some weeks before her expected delivery for Cæsarean hysterectomy which was performed on January 4th, 1907. The stump was treated extraperitoneally. She made an uninterrupted recovery."

I must mention that at the time I reported the above case, my experience was limited to 8 cases only, but subsequent experience has convinced me that every case of vesicovaginal fistula cannot be considered *operable*. Altogether 94 patients have been dealt with.

From a rough analysis of these 94 cases I find that no attempt to relieve them by any operation was made in 17 cases, the causes being 9 for bad health the result of malaria, 1 for cancer, 1 for cystitis, 2 for sloughing away of urethra with a portion of the neck of the bladder and extensive cicatrization about the vulva, and 4 refusal of operation, as no assurance could be given for their recovery.

Of the remaining 77 cases, I attempted to give relief in some way in 7 cases in which closure of the fistula was considered impossible, i.e., by colpocleisis in 5, by an attempt at formation of a urethra in 1, and by forming an artificial hypospadias in 1. A short account of the last case which is extraordinary will be given below.

It will thus be seen, that excluding the 4 cases which refused operation, an attempt to repair the fistula was made in 70 cases, with only 13 complete recoveries, 10 after the first, 1 after the second and 2 after the third operation; the remaining 20 were inoperable. It should be mentioned that of these cases 6 were complicated with rectovaginal fistula, all of which were operated on in the first instance and all of them were cured, but 4 of them left hospital without having the vesicovaginal fistula repaired.

I stated above that in 1908 my experience of these cases was limited to 8. Further experience of the last 20 years has, however, convinced me that the type of cases we get in Bengal, does not warrant the assumption that *every case of vesicovaginal fistula is operable and should be cured*. I am sure obstetricians in the British Isles can have no idea of the feeble, physically wrecked, malaria-stricken Bengali woman who presents herself for the relief of her miserable condition. In my series, 22 per cent. were inoperable, 19 per cent. were cured, while 59 per cent. were relieved.

I am afraid I have not been able to present a brilliant record. I can only say, I have tried my best, but could not achieve a better result. But at the same time, I should like to record the supreme satisfaction I felt at the look of gratitude and satisfaction of the 13 patients, when they were discharged from the hospital. I tell my students, that one successful operation for vesicovaginal fistula, counterbalances the glamour glory and "kudos" of one hundred Cæsarean sections.

In view of the expressed opinion of Dr. Herbert Spencer and Dr. Amand Routh, who believed

that every case of vesicovaginal fistula should be cured and the poor results obtained by me, I tried to obtain statistics from other hospitals in India.

The records of the Eden Hospital for the last 8 years show that during this period 95 patients were admitted with vesicovaginal fistula, of whom 78 were operated on and 28 were cured, showing that 18 per cent. were inoperable and 36 per cent. recovered. I am indebted to Lt.-Col. Green-Armytage for the above information.

The clinical reports of the Madras Maternity Hospital for 14 years show that out of a total of 503 cases, 188 recovered, a percentage of 37 per cent. This may be considered to be a fair average.

In comparison with the statistics of the Madras Maternity and the Eden Hospital, my results are decidedly poor, and the evident conclusion is that either the technique is faulty or that the surgeon lacks in skill. While I admit that I must be lacking in technical skill I should at the same time observe that usually cases rejected from the premier gynaecological hospital in Calcutta, viz. (the Eden), are admitted in the Campbell and the Carmichael.

To illustrate the utter impossibility of attempting to repair a vesicovaginal fistula, I will narrate the history of the following case:—A Brahmin girl about 15 was admitted to the Campbell Hospital as she had been refused admission in the Eden Hospital. The whole of the lower half of the bladder, with the anterior vaginal wall and the urethra were absent. The openings of the two ureters could be seen high up in the eloea, with a small chink in the middle representing the os uteri. By separating the labia a little, the remains of the bladder could be seen moving up and down with respiration. There was no tissue behind the symphysis pubis. The only thing possible to ameliorate her condition was to transplant the ureters into the rectum, but I did not attempt it, as I had no experience of that operation. I then suggested to the girl that I could so arrange that the urine should dribble from the lower abdomen, instead of through the lower passages. She thought that she would be able to go about and do her household duties much better if that was done and consented to the operation. Accordingly, I separated the posterior portion of the remains of the bladder, with the ureters, opening the uterovesical pouch, dragged it forward and fixed the edges to a supra-pubic opening, making a sort of artificial hypospadias. She recovered and became satisfied with her new condition. I cannot imagine how, with the sloughing away of more than half the bladder and the entire urethra, we could successfully repair the fistula!

The operability depends not only on the local condition of the parts, but also on the general condition of the patient, including her blood condition. During the last 8 years I refrained from operating when I felt that the condition of the patient was such that it precluded the possibility of success. Bad general health and bad blood condition, conduce to oozing, which prevents union. With increased experience, I choose my patients for operation better and have improved my results. While at the Campbell Hospital, in a series of 53 cases, I refused to operate only in one case, and attempted to do something in the remaining 52. Of these only 6 were cured (11.5 per cent.). In the subsequent

series of 41 cases in the Carmichael, I operated on 18 only with 7 recoveries (39 per cent.).

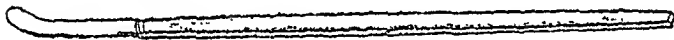
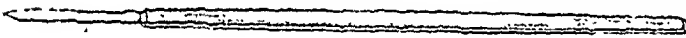
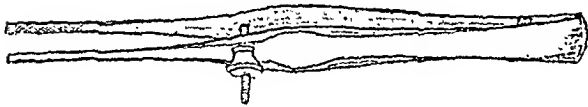
Regarding the technique of an operation for the repair of a vesicovaginal fistula, special attention should be paid to the following details.

(1) Proper position of the patient. An exaggerated lithotomy position with the buttocks raised 8 inches above the horizontal plane.

(2) Proper anæsthesia—Chloroform.

(3) Labia well retracted with temporary silk sutures to the corresponding thigh.

(4) Thorough denudation, with avoidance of hæmorrhage as far as possible. For this purpose I have devised two special knives and a special forceps with 2 to 3 rat teeth. The forceps is provided with a stem with a milled-head screw; which is worked with the fore-finger of the right hand, so that the amount of pressure may be gauged without injury to the tissues, at the same time relieving the fatigue of the fingers inevitable in the operations (*see Figures*).



(5) Proper suture needles and suture material. I prefer the small and medium cleft-palate needles—right, left and rectangular. For suture material, I prefer fine silk-worm gut.

(6) In the after-care, I try, if possible, to avoid leaving a catheter in the bladder.

AN OPERATION FOR THE RADICAL CURE OF CONGENITAL OBLIQUE INGUINAL HERNIA IN CHILDREN.

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HERNIAS in children may be truly congenital, that is existing from birth or may be acquired, that is they may descend later into a patent vaginal process which existed from birth. But both forms are ordinarily termed congenital. Acquired hernia of the type in which the peritoneal sac is pushed down as a result of intra-abdominal pressure may be said to be unknown in the very young. From the average of the reports of various observers of the frequency with which the peritoneo-vaginal process remains patent, it appears that the vaginal process remains unobliterated in 59 per cent. of children during the first four months and in 44 per cent. even during the fifth month. In spite of the fact that the peritoneo-vaginal process remains open in such a large percentage of cases, hernia in a child from

birth is a rare occurrence. All such hernias are ordinarily divided into two kinds, (1) congenital hernia, (2) funicular hernia.

In the descent of the testis through the inguinal canal a fold of peritoneum moves before it. This process of peritoneum is divided into three sections in accordance with its position in relation to the testis. Its lowest portion, which lies in front of the gland itself covering it in front and on either side, is called the vaginal process, the portion of it above the testis and which more or less surrounds the cord, is called the funicular process and the uppermost portion of it which lines the inguinal canal is known as the inguinal process. It is possible for the entire peritoneal canal to remain open and abdominal viscera to be pushed into it. In such an event the viscus lies above and in front of the cord whereas in the scrotum it lies to the outer side and somewhat behind the testis. This form of hernia is known as "congenital hernia." Such a sac shows three fairly marked constrictions at the points where the passage of the sac from the abdomen into the scrotum narrows it down, namely (1) at the internal abdominal ring, (2) at the external abdominal ring, and (3) at the neck of the scrotum.

When the peritoneal canal is closed only just above the testis and epididymis, remaining open in the upper part, a hernia may descend into the upper portion forming what is known as "hernia of the funicular process." In such a case the hernia may later descend to the bottom of the scrotum and it is then difficult to distinguish it from the ordinary congenital variety. But at operation the testis with its tunica vaginalis will be found behind the hernial sac.

It is usual, however, for it to descend up to a point above the testis thus enabling us to distinguish between this form of hernia and the complete congenital kind.

The above considerations permit us to regard all oblique inguinal hernias in children as practically congenital. These sacs are naturally very thin and of fine texture and show no thickening and cicatrization in their walls and are also said to be less adherent to their surroundings.

A congenital hernia is not often strangulated but when strangulated, this strangulation usually occurs during early infancy. It is important, therefore, that it should be operated on at the earliest possible opportunity.

It is maintained by some that if controlled by a truss, a congenital hernia in a child may become cured by itself. But the result is very uncertain. The arguments against such a course of action are that (1) a truss in a baby or a small child is irksome and painful, (2) an intelligent mother or nurse is required to be able to reduce the hernia, to put on the truss and take it off and to know when to put it on and when to take it off, (3) the truss owing to the rapid growth of the child needs to be frequently changed.

The operation that I describe is easily and quickly done without any mutilation of tissues

and may be performed under local anæsthesia with a few whiffs of ether, if necessary. Extensive separation of the sac from its coverings is not called for; nor is it necessary to separate the cord from the sac thus avoiding hæmorrhage, damage to the constituents of the cord and mutilation of surrounding tissues.

Operation.—An incision about an inch and a half long is made immediately over the external abdominal ring and the coverings of the sac are cut down upon anteriorly till the sac is opened. The sac is pulled down till the internal abdominal ring is seen and comes within reach. The distance from the internal to the external abdominal ring in a child is about half an inch. Now, extending the incision of the sac up to the internal ring, evert its edges and pick up with a purse-string suture of fine catgut on a small intestinal needle the wall of the sac at the neck from inside avoiding the cord. I have done this in several cases and have found no difficulty or ill-effects. No damage is done to the spermatic artery, or the vas and there is very little or no hæmorrhage. The purse-string suture is tied and the opening in the lower part of the sac due to the longitudinal incision closed with a continuous fine catgut suture along with the coverings, which have been incised. The skin incision is closed with horse-hair sutures. No bandaging is necessary. The skin sutures are covered with cotton-wool soaked in Friar's balsam and covered over with a piece of gauze kept in place by two or three strips of sticking plaster.

In this method no attempt is made to remove the sac which I consider unnecessary. If it is left alone and not kept open by abdominal contents, being serous its walls will collapse, become adherent and later atrophy. The neck of the sac brought together by purse-string suture will close by adhesions and cicatrization.

REPORT ON SOME CASES OF FIBROIDS AND UTERINE HÆMORRHAGES TREATED BY RADIUM.

By K. S. RAY, M.A., B.SC., M.B., CH.B. (Edin.), M.L.C.

THE usefulness of radium in the treatment of fibroids and uterine hæmorrhages, though quite well known and firmly established in Europe, has not until recently received the same recognition among the practitioners in Bengal. This was mainly due to want of proper facilities for the radium treatment on scientific lines. So far the only institution where radium was available was at Ranchi. The expenses for the journey and for the treatment stood in the way of many patients and they had to go through a lot of difficulties and inconveniences to undertake the long journey to Ranchi. Moreover, the success of radium treatment also depends largely on the co-operation which the radiologist receives from the specialists in different departments. Very often the co-operation of a surgeon, unless the radiologist is also an experienced surgeon, is necessary.

The appendix will show a record of 27 cases of uterine fibroids treated by radium at the Calcutta Polyclinic. Radium is not available at any of the large hospitals in Calcutta, but private enterprise has supplied this deficiency and the Calcutta Polyclinic is now able to undertake radium treatment.

The present paper is intended only to deal with the treatment in cases of chronic metritis, uterine fibroids and menopausal hæmorrhages. The menorrhagia or metorrhagia associated with these conditions respond very satisfactorily to radium treatment.

Methods employed.—The following method which is recommended by Dr. Hayward Pinch was followed in most of the cases:—

The cervical canal is dilated and a tube of 50 milligrams of radium screened with 2 millimetres of lead and 3 millimetres of rubber is introduced into the uterine cavity for 24 to 30 hours.

One such exposure may suffice. If not, one or two more applications may be necessary. If the patient be past the child-bearing period, there is no objection to induction of menopause which usually results after 2 or 3 exposures.

The internal administration may be supplemented by external radiation by flat applicators screened with 2 millimetres of lead and rubber applied over the fundus and ovaries. In some cases, however, as will be found from the appendix, marked improvement followed even in those cases where external application was not made. In some, smaller doses than 50 milligrams were also found effective. For instance, 25 milligrams sheathed in lead and rubber inserted into the uterine cavity by dilating the cervix and kept for 36 to 48 hours gave excellent results.

Menorrhagia.—The improvements so far as menorrhagia is concerned have been found to be as follows:—

The results of treatment were slightly different in cases nearing the menopause from those of younger age. In both classes, in some cases but not in all, there was an increased flow at the next menstrual period. In women past the child-bearing period and nearing the menopause, the successive periods showed a decrease in the flow and in most cases after a month or two, complete amenorrhœa occurred. In younger women, the subsequent periods gradually became normal and in some cases complete amenorrhœa resulted. There is one interesting difference noticed in respect of the latter group. Periods reappear after 6 months or 1 year or in some cases 2 years after the last exposure. In one case as stated in the appendix, the periods not only reappeared but very profuse bleeding set in 6 months after she had an exposure of radium at Ranchi and she improved in health after a second exposure. The periods stopped and there has been complete amenorrhœa since.

Uterine fibroids.—The results so far as uterine fibroids are concerned have been very remarkable. Hæmorrhage, as has been said previously, was controlled in every case. As regards diminution

of size of the tumour it is noticeable, especially if the fibroid is of a myomatous nature. Hence, this method of treatment of fibroids is in many ways far superior to operative removal, and the risks and troubles of abdominal operations can be safely avoided.

In one or two cases the size of the tumour was diminished first, but subsequently enlarged again. This was probably due to insufficient dosages and in both cases where the enlargement was noticed, radium in higher doses was reapplied with the result that the size of the tumour was reduced almost to vanishing point. The pressure symptoms gradually disappeared.

The immediate arrest of hæmorrhages after radium application in many cases may be due to plugging of the vagina and uterus while the radium is inside the uterus, and to a certain extent to the degeneration and destruction of the endothelial cells lining the fine arterioles and capillaries of the uterine mucosa, thus facilitating the formation of clots inside the lumen of the arterioles and capillaries. The late arrest of hæmorrhage of fibroid origin after prolonged or frequently repeated irradiations can be ascribed to the production of fibrosis from the organisation of the largely increased number of fibroblasts which develop in response to the stimulation of the Gamma rays emitted by the radium.

In conclusion I offer my best thanks to Drs. Kedar Nath Das, Bamandas Mukherji, Sundari Mohan Das, N. N. Basu, S. N. Bagchi and M. Sanyal, and to Lt.-Col. Green-Armytage, I.M.S., and other leading gynecologists in Calcutta for referring their cases to me at a period when the radium treatment was quite new in Calcutta.

APPENDIX.

Case No. 1.—Mrs. R. D., Hindu, aged 24. History of menorrhagia 6 or 7 years, amenorrhœa for 6 months, 2 or 3 years ago followed by severe bleeding during the periods.

Diagnosis.—Fibroid uterus.

Treatment.—Radium.

1st application—21 hours } Interval 2 months.

2nd application—48 hours }

Result.—Ten days after the 1st application the periods started and continued till two months later. Examined 2 months after 1st application—very little change noticed. Marked improvement after 2nd application—no bleeding.

Dose of radium used.—1st application 25 mgms. 2nd—50 mgms. inside the uterine cavity with brass and rubber screening.

Case No. 2.—Mrs. M. K., Hindu, aged 14.

History of 1st menstruation—3 years back. Two months interval between periods for first 8 months. After this bleeding for 16 days (stopped on taking medicines). During 2nd 8 months—interval between periods varied from 13 days to 2 months, period each time lasting for a week. Bleeding for 45 days (stopped by taking medicines).

After 2 months again bleeding for a month (stopped again by medicines and local treatment). Then for 4 months—periods regular each month but lasting each time for 7 days. Next 2 months—irregular periods.

Again bleeding for about one month in spite of medicines per month, injections and local treatment; stopped, however, by absolute rest.

Treatment.—Radium.

1st application—24 hours } 25 mgms.

2nd application—48 hours }

Result.—Bleeding continued profusely for a fortnight after which the periods were normal.

Case No. 3.—Mrs. C. G., Hindu, aged 32 years, married at 12, multipara, last child at 25. History of leucorrhœa since the birth of the last child, ruptured perineum, menorrhagia, no sign of malignancy in cervix but it easily bled on examination. Multiple tear in cervix and a patch of erosion. Uterus healthy.

Treatment.—Radium applied in cervix.

1st—25 mgms. for 24 hours.

Result.—Reported 2 natural periods since application. Now free from all complaints.

Case No. 4.—Mrs. A., Hindu, aged 50. Multipara. History of menorrhagia 10 years. Anæmia, uterus enlarged to the size of a foetal head at brim, freely movable; appendages not palpable.

Treatment.—Radium applied on 2 occasions at one month's interval.

Result.—Menopause set in with diminution in size of growth.

Case No. 5.—Mrs. U. D., Hindu, aged 36. Children—8.

Last child 1½ years ago. Menorrhagia—duration 8 or 9 days, passes clots, very painful, last menstruation 16 days ago, slightly anæmic. Cervix—small tear, feels normal; uterus retroverted, bulky and replaceable; appendages not palpable. Re-examination—5 months later.

Menstruation 18 days ago, lasted 8 days, profuse but 2 previous ones less profuse, passed clots; uterus retroverted, bulky and tender; cervix—bilateral tear appendages not palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 25 mgms. 24 hours; a 2nd application was made a week after. Hæmorrhage stopped with diminution in size of uterus within a month of last application.

Case No. 6.—Mrs. S. D., Hindu, aged 32. No children or abortions. Complaints of excessive menstruation stopped since for 2 days, pain.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied, 1st 60 mgms. 48 hours and 2nd 60 mgms. 24 hours.

Result.—Bleeding continued for 3 days after the 2nd application after which the patient never reported again.

Case No. 7.—Mrs. J. D., Hindu, aged 26.

Two children both dead, no abortions.

History of dysmenorrhœa—15 days, passed clots; periods lasting 7 days. Last menstruation 7 days ago.

Diagnosis.—Fibroid uterus, size of an orange.

Treatment.—Radium applied.

1st 25 mgms. inside and 10 mgms. outside—24 hours.

Result.—Not known, the patient did not report herself again.

Case No. 8.—Mrs. C., Hindu, aged 52.

Five children, last child—17 years ago. Bleeding for last 2 months.

Irregular, profuse and painful menstruation lasting 15 to 18 days, constipation; anæmia; tenderness all over lower abdomen, outlet—slightly relaxed, uterus retroverted, replaceable, enlarged to foetal head, feels very hard; appendages not palpable, bloody discharge present.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. inside and 10 mgms. outside 24 hours—slightly bleeding.

2nd 35 mgms. 24 hours—slightly bleeding.

Reported after a week. Bleeding practically stopped excepting staining now and then. Reported 3 months later. No bleeding for 8 days. Radium again applied—3rd 25 mgms. 24 hours (after cervix dilated up to 14[Hg]). Reported 1 year later. No complaint—report of internal examination was as follows:—

Outlet—relaxed, cervix atrophied, uterus super-involved, movable, appendages not palpable.

Case No. 9.—Mrs. S. R., Hindu, aged 43.

Children 6. Last child 9 years; no abortions. Profuse bleeding stopping for 7 months after one radium exposure at Ranchi a year ago. Again profuse bleeding.

A submucous fibroid polypus (sloughing) removed 2 years ago. Cervix healthy, uterus bulky, feels hard, freely movable, appendages not palpable.

Treatment.—Radium applied.

1st 40 mgms. 24 hours (cervix dilated up to 10[Hg]).

No bleeding from 2nd day of application.

Case No. 10.—Mrs. D., Hindu, aged 30.

No children or abortions.

Menstruation—regular, painful and profuse, lasting 4 to 7 days passing clots.

Menstruation stopped on the previous day, hæmorrhage —7 years; pain in left leg radiating upwards, in each period—4 years, constipation. Pale, outlet normal, cervix—small cyst in anterior lip, uterus enlarged to tennis ball, very hard, freely movable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. 24 hours.

Reported one month later—menorrhagia less, pain slightly less.

2nd 55 mgms. 24 hours. Reported 1 month later—one period due in the middle of the last month suppressed. Pain, etc., same as before. Reported 1½ years later. No menses since last report.

Case No. 11.—Mrs. S. D., Hindu, aged 45.

Children 6. Last child 22. Abortion 1.

Menorrhagia for last 2 years. Frequent micturition, enlargement of lower abdomen, excessive hæmorrhage. Uterus—tilted cervix—left, old laceration in left side of cervix, tumour—size of 2 fingers above umbilicus.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 50 mgms. plus 10 mgms. 30 hours. Examined one year later, uterus diminished in size up to symphysis pubis but again enlarged.

2nd same—24 hours. Tumour again diminished in size and pressure and symptoms relieved. Hæmorrhage stopped.

Case No. 12.—Mrs. K. D., Hindu, aged 36.

Two children, one died four days after birth. Last child 15 years.

Menstruation regular, complains of excessive hæmorrhage, watery discharge. Uterus enlarged to foetal head, freely movable, cervix bulky, appendages not palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. 24 hours. Examined 1 month later. periods started a week after radium. Discharge of blood on 3rd day moderate. Period stopped on 4th day.

2nd 55 mgms. 24 hours. No marked improvement noticed.

Case No. 13.—Mrs. J. D., Hindu, aged 50.

Children 9, last child 16 years.

Menorrhagia last 10 years, anæmic, uterus enlarged to size of foetal head, freely movable, appendages not palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. 24 hours. Tumour diminished in size and bleeding stopped.

Case No. 14.—Mrs. M., Hindu, aged 45.

Children 7, last child 17 years.

Menstruation regular, profuse, painful lasting 7 to 8 days.

Last menstruation 25 days ago.

Complains of constant pain over lower abdomen and back—2 months. Poor appetite, anæmic, soft systolic murmur at apex.

A hard mass felt over abdomen just above pubis—tender.

Outlet—incomplete tear, cervix enlarged to foetal head, feels very hard, normal in position, appendages not palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 85 mgms. 24 hours. Nausea after 1st application, no relief of pain.

2nd 55 mgms. 24 hours. Nausea. A week after nausea was relieved and tumour diminished in size and menopause set in.

Case No. 15.—Mrs. K. B., aged 40.

Child 1. No abortion.

History of kala-azar in the middle of 1923. Amenorrhœa then for 10 months. After that irregular and painful menstruations for 2½ years. Unbearable pain, profuse hæmorrhage and clotted blood, 3 or 4 months.

Diagnosis.—Uterine fibroid.

Treatment.—Radium applied.

1st 45 mgms. 24 hours. Examined 3 months later, size that of a small orange.

2nd 45 mgms. 24 hours. Reported 7 months later. Patient much improved in health, weight increased, spleen diminished in size.

Fundus small, slightly retroverted, no tumour felt.

Case No. 16.—Mrs. S. M., Hindu, aged 45.

Children 11. Last child 10 years. Abortion a year ago.

Bleeding off and on for 1½ months, backache 8 months ago. Severe hæmorrhage 15 days after a period; appetite bad; constipation now and then. Uterus enlarged to small foetal head.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 55 mgms. 24 hours.

2nd after one month 45 mgms. 24 hours. Size reduced to half.

Case No. 17.—Mrs. S., Hindu, aged 43.

Children 4. Last child 22 years.

Menorrhagia, backache.

Uterus normal in position, slightly bulky in size, movable.

Cervix—consistency normal, old tear.

Appendages. Right ovary enlarged and palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. 24 hours. Bleeding continued after removal. Examined 2 weeks later. No bleeding since.

Case No. 18.—Mrs. S. D., Hindu, aged 42.

Children 3. Last child 8 years. No abortion.

Complains of weakness, swelling, palpitation, defective eyesight, menorrhagia, daily fever.

Dysmenorrhœa, menorrhagia for 1½ years. Last menses started 2½ months ago and stopped 20 days ago. Uterus enlarged.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. 24 hours.

One month later, 2nd 24 hours.

Two months later, 3rd 24 hours. Marked improvement since last application.

Case No. 19.—Mrs. J. H., Hindu, aged 45.

No child. Abortion 1 (20 years ago).

Complains of headache, giddiness, weakness, discomfort in abdomen, frequent micturition, swelling of ankles, constipation. Menstruation used to last 15 to 20 days, now and then amenorrhœa for 3 or 4 months. Menstruation at present lasting for 4 days with profuse bleeding followed by leucorrhœa for 15 days. Enlarged uterus up to the umbilicus.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 60 mgms. 24 hours. Marked improvement in general health and diminution of size of tumour and free from all symptoms.

Case No. 20.—Mrs. G., European, aged 39.

Child 1.

Profuse bleeding for 2 years, lasting 12 to 14 days, clots passed, anæmia, palpitation, indigestion.

Uterus—retroverted, enlarged to duck egg.

Cervix—normal.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 45 mgms. 48 hours. No hæmorrhage, general condition good, some watery discharge.

2nd 45 mgms. 48 hours. Hæmorrhage for 6 days. Reported 2 weeks later.

3rd 45 mgms. Reported 5 months later, complained of throbbing pain in rectum, passing of mucus, continued whitish discharge from uterus, inflammation of lips, prolapsus rectum.

No more hæmorrhage since last application. Rectal troubles also disappeared with improvement in general health.

Case No. 21.—Mrs. G., Hindu, aged 44.

Uterus enlarged up to umbilicus, 1½ years.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 50 mgms. 24 hours. Reported one month later. No bleeding yet, although 7 days passed since menstrual date.

2nd 50 mgms. 24 hours. Reported 2 months later. Tumour very much smaller, size that of an orange, after 6 months again increased in size but decreased after another application. The patient is still under observation.

Case No. 22.—Mrs. B., Hindu, aged 23.

Children 3. Last child 6 years. No abortion.

Puncture—1 at 8th month 3 years ago.

Complains of bleeding, 2 months, pain over lower abdomen off and on. Bleeding profuse for the last 3 years. Before regular and profuse. Cured after one year ago after which bleeding normal for 8 months. On examination—excess adipose tissue over abdominal wall. Slight tenderness over left lower abdomen.

Outlet—normal.

Cervix—external os patulous.

Uterus antroverted, slightly bulky in size, freely movable, feels hard.

Appendages not palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 24 hours. Reported 1 month later. Bleeding increased passing clots.

2nd 32 hours. Reported 3 months later. No bleeding last 15 days. Uterus small. No fever for 8 days. Reported 1 year after. No complaint. No periods since.

Case No. 23.—Mrs. M. D.

Child 1 died one month after birth.

Complains of excessive hæmorrhage, tumour in abdomen, pain on micturition.

On examination—cervix healthy, uterus enlarged to 4 months pregnancy.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st application—24 hours. Reported 2 weeks later. No bleeding for last one week.

2nd application—65 mgms. 24 hours. Patient improved and free from symptoms.

Case No. 24.—Mrs. E., European, aged 49.

Children 2 alive, abortions 4, last child 7 years.

Complains of excessive hæmorrhage from uterus.

Irregular periods for 1 year, stop for a month or two and reappear. Excessive bleeding off and on 4 months ago.

On examination—uterus freely movable, enlarged to 2 months pregnant. Cervix normal.

uterus.

applied.

1st 50 mgms. 24 hours.

2nd 50 mgms. 24 hours. One month after free from symptoms. No period 6 months.

Case No. 25.—Mrs. M. D., Hindu, aged 39.

Children 8, last child 9 years ago, no abortion.

Complains of hæmorrhage (no bleeding for last week). Excessive menorrhagia since 1921, duration 15 to 29 days. Cured in 1924 after which temporary improvement for 2 or 3 months. Bleeding increased again.

On examination—outlet—lax, uterus slightly bulky, retroverted fixed especially on right side, os patulous, cervix—healthy.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 70 mgms. 24 hours. Reported 1 week later. Bleeding increased. Reported 2 weeks later.

2nd 60 mgms. 24 hours. Reported 4½ months later. No bleeding last 3 months. Great improvement in general health.

Case No. 26.—Mrs. R. K., Hindu, aged 35.

Children 4, last child 10 years, abortion 1.

Complains of excessive hæmorrhage for last 3 years. Passes clots. A polypus removed in 1927 after which she was better for 6 to 7 months. Bleeding began again every 15 days lasting 2½ months, more or less continuous.

Menstruation. Started at 15. Regular at first.

Treatment.—Radium applied.

1st at Sevasadan in 1926.

2nd 24 hours 50 mgms. Two years later.

3rd two weeks later. No bleeding since 1st application.

Case No. 27.—Mrs. S., Hindu, aged 49.

Children 6, last child 13 years; no abortion.

Complains of excessive bleeding for last 3 months.

Menstruation regular before.

On examination—cervix healthy, uterus bulky, movable, appendages not palpable.

Diagnosis.—Fibroid uterus.

Treatment.—Radium applied.

1st 40 mgms. 24 hours. Reported one month later.

2nd 40 mgms. 24 hours. No bleeding since.

A Mirror of Hospital Practice.

TWO CASES OF (?) TICK FEVER FROM POONA.

By M. N. PAI,

LIEUTENANT, I.M.S. (T. C.),

Indian Military Hospital, Poona, M. L.

It appears from Col. Megaw's article in the June number of the *Indian Medical Gazette* (1928) that Indian tick typhus has not yet been reported from Western India; the following two cases are of interest as both of them occurred among the men of the 2nd Lancers who had been grazing their horses in the neighbourhood of Poona, where ground rats and squirrels are found in large numbers.

Case No. 1.—The patient was admitted into the Indian Military Hospital, Poona, on 5th September, 1927, his complaint being pain and enlargement of the right testicle, fever and constipation.

Previous History.—There was no history of syphilis or gonorrhœa; he had been in Poona for the last 10 months, and had received 1 c.c. T. A. B. vaccine in March 1927.

Condition on Admission.—The patient was a young man not anæmic, teeth and tongue coated, throat congested.

Respiratory and Circulatory systems.—Normal.

Liver not enlarged.

Spleen palpable two fingers' breadth below the costal margin in the left nipple line. Glands not enlarged. The right testicle was enlarged and tender. Epididymis and cord normal. No discharge from the penis.

Blood.—No malarial parasite was found in his blood on three successive examinations. Moderate leucocytosis, 16,000 per c.mm.

The patient was put on quinine for two days and the local condition of the testicle was attended to, but the patient's temperature still kept up and while the testicular pain lessened he began to complain of severe arthritic pain in all the joints though there was no effusion or swelling of any of them. His blood culture was found to be sterile and the Widal result negative.

On the seventh day after admission he developed a macular rash on the ankles and wrists. It became petechial in nature next day and extended to the forearms, arms, chest and abdomen. By the ninth day the whole body including the face, neck and back was covered profusely with a dark purplish rash. The rash on the

back was not unlike that seen sometimes in secondary syphilis. His Wassermann reaction, however, proved to be negative. From 12th September, 1927, onwards the temperature came down by lysis, the pains in the joints subsided and the rash became more persistent. The temperature reached normal on the sixteenth day, but the rash persisted till 21st October, 1927. He made an uninterrupted recovery. No ticks were found on his body.

Name—Sowar Surat Singh. Age—26 years. Disease—Tick Typhus (Spotted fever).
Date of admission—5-9-27. Date of discharge—22-10-27. Result—Recovered.

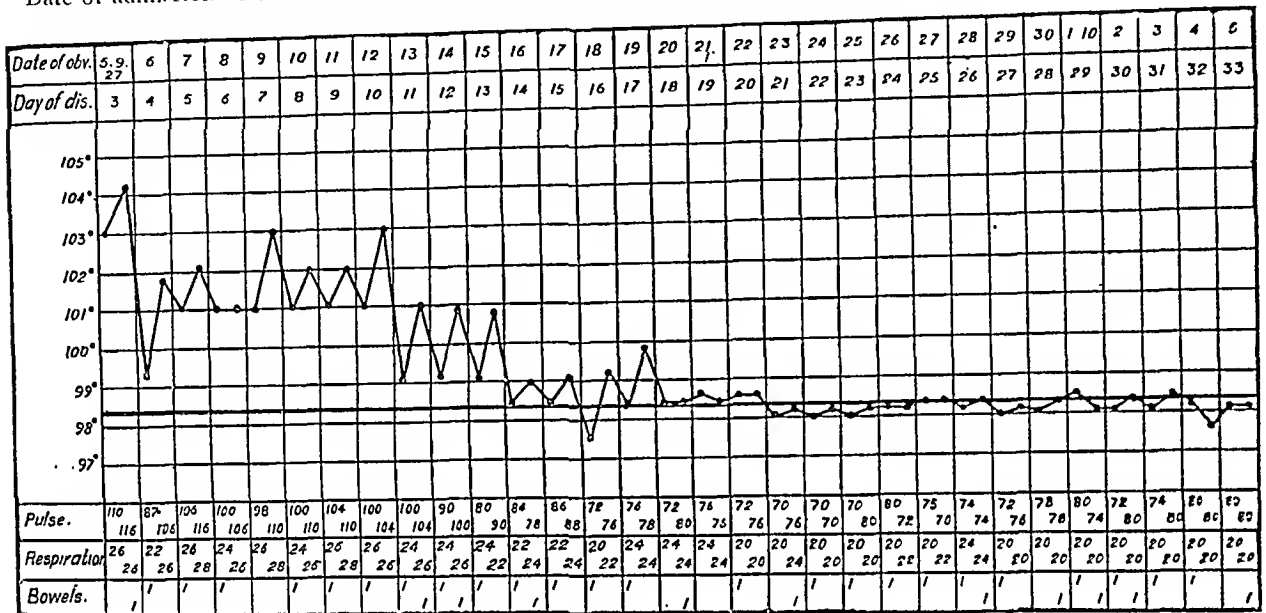
A CYST OF THE MEDIAL MENISCUS OF THE KNEE.

By K. G. PANDALAI, F.R.C.S.,

MAJOR, I.M.S.,

Second Surgeon, Government General Hospital, Madras.

THIS condition is rare and on a search of the records of the Madras General Hospital, no case has yet been reported. It is known that cysts occur in most tissues of the body, but cartilage



Case No. 2.—The second case was that of a Lance Dafadar, who was admitted into the Indian Military Hospital, Poona, on 29th September 1927, his complaint being fever of four days' duration and slight cough. This case was similar to the above in details except that there was no orchitis and the temperature came to normal on the twentieth day. The points of interest in these two cases are the marked arthritic-like pains without any effusion in the joints, the moderate leucocytosis at the onset, the appearance of the rash on the ankles and wrists rapidly spreading over the whole body including the face and neck, the persistence of the rash for more than four weeks, and the fall in temperature with the commencement of the rash.

The negative blood culture, and negative Widal differentiated this fever from typhoid.

The insidious onset, the fall of temperature with the appearance of the rash, spreading over the whole body including the face and neck, the negative Weil-Felix reaction, and the presence of joint pains differentiated it from ordinary typhus.

My thanks are due to Major G. S. Wallace, O.B.E., R.A.M.C. A. D. of P. H., Southern Command and Major D. Pottinger, M.C., R.A.M.C., Specialist in Medicine, Poona District, for seeing these cases in consultation with me and for assisting me in making a definite diagnosis.

seems only exceptionally to be the seat of such a lesion. A recent paper (1) on the subject of cysts in cartilage by Zadek and Jaffe discloses the fact that only three cases have been reported in the literature. The case which is now recorded is, therefore, of more than ordinary interest.

Mr. H. R., aged 21 years, student, Hindu, well-nourished, was admitted on 3rd August, 1925, for a rounded, tense and somewhat painful swelling on the inner part of the knee-joint of two years' duration. He was an ardent tennis player and attributed the condition to the strain of his favourite game. The swelling was tense and elastic, one inch in diameter and appeared to be fixed to the joint capsule. It was slightly tender and movement of the joint was somewhat limited both in flexion and extension. There was no heat or redness locally and X-rays did not reveal any abnormality in the bones. Clinical examination did not reveal any other pathological condition elsewhere.

Operation was performed on 4th August, 1925, and demonstrated the fact that the swelling was attached to and was a part of the medial meniscus which was therefore removed *in toto*. The capsule of the joint was closed with a few sutures of interrupted catgut and the wound closed. Healing took place by first intention, all pain and discomfort in the knee disappeared completely, and there has been no further trouble up to date.

i.e., about $2\frac{1}{2}$ years after the operation. On cutting into the swelling in the cartilage, it was found to be a cystic cavity three-quarters of an inch in diameter containing thick, clear, jelly-like fluid. Unfortunately, a microscopic section could not be obtained.

Comment.—The age of the patient (21), the long duration (2 years) and the history of repeated trauma are noteworthy. Hitherto, trauma had been noted in 50 per cent. of the cases although the internal semilunar cartilage had been noted to be the favourite site in previous cases, this case demonstrates that both cartilages are equally liable.

(The author's meaning is not quite clear; surely, "medial meniscus" is a pseudonym for "internal semilunar cartilage."—Ed., I. M. G.)

REFERENCE.

Zadek and Jaffe. *Archives of Surgery*, Vol. 15, No. 5.

A CASE OF DOUBLE MONSTER.

By M. UMAR, F.M.S.,

Medical Officer, Bijnor, U. P.

THE patient, M., was aged 20, caste Chamar, of Nabada, District Bijnor.

History.—Labour pains were slight, and there was prolapse of one leg from the vagina. Duration of labour, one day.

When the patient came to the hospital, the membranes were ruptured, pregnancy was of full term and the woman was a primipara. The abdomen was unduly large which suggested twins. The temperature was 101.4°F . and the pulse was 120 to the minute. As is customary in India, the patient had been treated by *dais* and digital examination proved that some sort of medicine had been put into the vagina.

Abdominal palpation.—Two globular masses were felt. As a leg was protruded there was no doubt the case was a breech presentation. Fœtal heart sounds could not be heard. The os was fully dilated. Chloroform was given and the other legs were brought down in succession. The appearance was remarkable; all four legs were in one pelvis and there were two ani.

The monster was delivered with great difficulty, but there was no rupture of the perineum. There were two separate heads each with a neck branching from a single trunk. There were four arms, one cord and one placenta. The labour finished at 1-30 p.m., and the placenta was delivered five minutes after the fœtus. There was slight post-partum hæmorrhage. Immediately ergotinine gr. 1/100 was given hypodermically and a hot intrauterine douche. The woman is doing well.

A CASE OF LANDRY'S PARALYSIS.

By A. K. M. ABDUL WAHED, B.Sc., M.B.,

House Surgeon, Presidency General Hospital, Calcutta.

A BOY, aged 10, was admitted to the Presidency General Hospital, Calcutta, on the 12th April,

1928, in a condition of what appeared to be almost total paralysis or paresis of voluntary muscles.

That the onset of the weakness was rapid could be gathered from the mother's somewhat vague story which ran like this: "The child who was in normal health fell down two weeks ago and was found later to be quite helpless." No history of fever immediately preceding the onset was given.

On examination, complete loss of power without appreciable wasting was found to be present in the lower limbs. In the upper limbs voluntary movement was limited to flexion and extension of the elbows, but these movements could not be performed against slight resistance. Weakness was marked in the muscles of the back, consequently the sitting posture could not be maintained. Weakness was also present in the sterno-mastoids, trapezius, and in the muscles of the face though the latter muscles were involved to a lesser extent.

Ocular muscles, muscles of respiration and deglutition were completely spared.

The affected muscles were in all cases flaccid but not wasted. General nutrition was good. The tonus in the extensor muscles was diminished to a greater extent than that in the flexors—foot drop and wrist drop being very prominent.

As regards deep reflexes knee-jerks, ankle-jerks, wrist and finger-jerks, supinator, biceps, and triceps jerks were all absent and as to superficial reflexes, epigastric, abdominal and cremasteric were present. The plantar reflexes were indeterminate.

Sensation to pin prick, cotton-wool, heat and cold was normal. There was no loss of postural sense or of tactile discrimination. There was, however, some tenderness on pressure over the calf muscles.

Heart and lungs were normal.

The case was obviously one of peripheral neuritis and all the common toxic causes were in turn excluded.

There remained for consideration beri-beri and Landry's Paralysis or Polyneuritis.

Against the former the following points were predominant:—

- (1) The extreme rapidity of onset.
- (2) The complete absence of any sensory changes with the exception of tenderness on pressure of the muscles.
- (3) The complete absence of any involvement of the heart with such widespread paresis.
- (4) The absence of cedema and wasting.

The patient completely recovered after a six weeks' stay in hospital. He was treated by massage and faradisation to the affected muscles with re-education. *Oleum morrhue* was given internally.

I have to thank Major H. G. Alexander, I.M.S., Surgeon Superintendent of the Presidency General Hospital and Captain T. H. Thomas, I.M.S., for permission to publish the case.

Indian Medical Gazette.

DECEMBER.

THE TREATMENT OF KALA-AZAR.

Just over thirteen years ago kala-azar was looked upon by the medical profession as a fatal disease and making a diagnosis of kala-azar was tantamount to giving a death sentence. There was no specific treatment for the disease. Actually a certain number of patients recovered. It is not possible to say how many because even at the present day, although we know that a certain number of persons get a mild form of the disease in which spontaneous cure occurs, we do not know how large this number is. Even amongst those in whom the disease was well developed a few, but a very few, recovered.

The history of the discovery of the specific treatment, in the form of intravenous tartar emetic, and its introduction into this country by Sir Leonard Rogers and others is so well known that it is unnecessary to repeat it. The treatment with the antimony tartrates was such a great advance on any treatment which had been used previously that many were prepared to be satisfied with it. To those who had seen emaciated patients come into the wards of a hospital, apparently improve slightly, then go downhill again and eventually die or leave the hospital in a hopeless condition, this new (at that time) treatment, during which the patient steadily improved eventually to walk out a robust individual, so changed that in some instances he was not at first recognised by his own people, seemed almost too good to be improved upon. Nevertheless, there *was* considerable room for improvement. Amongst those who underwent treatment the death-rate was decidedly high; it is difficult to say how high it was as the records on this point were very seldom obtained or, at any rate, reported, but in one of the large Calcutta hospitals the death-rate amongst in-patients undergoing treatment with the antimony tartrates during one year was 15 per cent. and in the out-door department 25 per cent. (but this latter figure includes patients who discontinued treatment too early and died of kala-azar on this account), and in well-conducted treatment centres in the mofussil, where conditions are probably less favourable, death-rates as high as 50 per cent. have been reported. The treatment by means of these salts extended over a very long period during which an average of 30 injections had to be given, consequently a very large number of patients failed to complete the full course of treatment. There were certain very disagreeable symptoms associated with their administration, such as coughing, vomiting and joint pains,

which also encouraged patients to discontinue their treatment too early. And, finally, a small number of patients showed no improvement when treated by these salts.

For about eight years the antimony tartrates were employed almost exclusively in the treatment of kala-azar. It is true that as far back as 1916, pentavalent compounds of antimony had been prepared and at least one had been employed successfully in the treatment of the disease. Work on these compounds was continued during the intervening period but it was not until 1924 that they began to come into general use. Up to the present a large number of pentavalent antimony compounds have been prepared and tested; some of them have proved failures and have not been issued to the general medical public; others have been placed on the market by reliable British, Indian and German manufacturers. Almost all the latter have proved infinitely superior to the tartrates. The death-rate amongst patients treated was, in the case of one drug which had an extensive trial but has now been superseded, 10 per cent., but the average death-rate is about 5 per cent., and in the case of one compound which is only recently available for the public, the death rate in a very large series was 2 per cent. The toxicity of these compounds being very low, in most instances one-tenth that of the antimony tartrates and in some even lower, very much larger amounts of antimony can be given in each individual dose and the full course thus completed in a much shorter period; a course of 12 injections occupying a period of three to four weeks is usually advocated, but with one drug, already referred to above, a course of 8 injections given within a period of a week has produced a very high percentage cure-rate. Symptoms such as coughing, vomiting and joint pains are not associated with the administration of these drugs, and a certain number of patients who show no improvement during treatment by the antimony tartrates react very readily to the pentavalent compounds.

At first the pentavalent compounds were so expensive that only well-to-do patients undergoing treatment in their own homes could afford to buy the new drugs; a full course cost about Rs. 40, excluding the doctor's fees, and it was, therefore, quite out of the question for provincial governments to consider issuing these compounds to dispensaries. Three years ago we wrote, "It is obvious that the only real obstacle to the introduction of the new antimony compounds into general use is the present very high cost. There are two factors which influence the price—firstly, the process of manufacture is an expensive one, and, secondly, there has, up to the present, been very little competition in the manufacture of these compounds. It is not suggested that manufacturers have been profiteering but it is obvious that if a number of commercial firms can produce pentavalent compounds

of proved leishmanicidal value, healthy competition will be started and the various manufacturers will be compelled to study economy in the process of manufacture It seems, therefore, desirable that in order to combat any attempt at 'cornering' any of these compounds reputable chemical manufacturing firms should receive every encouragement to manufacture and place on the market any pentavalent compound that has been thoroughly tried and shown to be of definite therapeutic value in the treatment of kala-azar. . . . " This is exactly what has happened. New commercial interests and new compounds have come into the market and at the present day the manufacturers who were retailing their compound at the rate of Rs. 25 a gramme are prepared to supply the same drug to provincial governments at as low a price as Rs. 1-8-0 a gramme. This has made it possible for a province like Assam to use the pentavalent compounds exclusively; during 1925 over 60,000 persons were treated for kala-azar in this province, almost all by sodium antimony tartrate. During the succeeding year about 10 per cent. of a total of nearly 50,000 persons were treated by one of the pentavalent compounds, but it was not until the middle of last year (1927) that the price was reduced to a figure which made it possible for this drug to be used exclusively in all hospitals, dispensaries and kala-azar treatment centres. During 1927 about 33,000 persons were treated for kala-azar; the allowance for each patient would be about 2 grammes, so that if this annual figure were maintained the expenditure for this one drug alone for one year would be about a lakh of rupees. This is no small sum to ask a comparatively poor province to pay, and the authorities concerned would probably hesitate to ask for so large a sum did they not realise that the disease is one of such great economic importance and that this extra expenditure now will probably save the province many times this amount during the next few years. The immediate result of the change from sodium antimony tartrate to a pentavalent compound is the reduction of the death-rate amongst those undergoing treatment from at least 15 per cent. to about 5 per cent., or the saving of the lives of at least an additional three thousand odd persons. This, and the fact that the treatment occupies a much shorter period, will tend to popularise it and to encourage the patients to continue treatment until they have had a full course. These are extremely important points now and will be even more so during the next few years. Assam has been subject to epidemic waves of kala-azar; the peak of the last wave was probably during the years 1923-24, and the inter-epidemic period is now rapidly approaching. It is during this period that the treatment campaign in the province should be intensified rather than relaxed. If the few smouldering foci of infection which would normally form the sparks to light the next epidemic blaze could be smothered by the aid of this new and more effi-

cient treatment, it seems probable that the disease might be stamped out altogether in the province. If this effort is made one can at least predict with certainty that, even if there is another epidemic, it will be an abortive one with a very limited distribution. Although these remarks apply more especially to Assam where the epidemic periodicity is most marked, they are also applicable to other provinces where kala-azar is a serious problem, for example, Bengal and Bihar.

At the time that we wrote the above-quoted sentences we also added a warning, "There is, of course, the danger that useless and even dangerous antimony compounds will be produced and sold at a cheap rate by unscrupulous persons, either as one of the antimony compounds whose value has been proved, or as 'an improvement' on one of these compounds. To-day it is very necessary to repeat this warning. The manufacture of certain of the pentavalent compounds is covered by patents and they are sold under proprietary names, but in the case of others the composition and method of manufacture is published so that anyone can make them and put them on the market. Here is an obvious danger. Quite recently it has been pointed out in a paper in the *Indian Journal of Medical Research* that the commercial samples of one of the pentavalent compounds, of which the calculated antimony content is 35 per cent., contained amounts of antimony varying between 19 per cent. and 43 per cent. This sort of thing is very unsatisfactory. In this particular drug, one of the main constituents is in very loose combination, so that it is really more like a mixture than an actual compound; under these circumstances it is difficult for the manufacturer to be certain that the antimony content of each batch will be exactly the same, but it is certainly desirable that it should vary only within certain limits.

As time goes on commercial competition will become more and more acute and there will be still further cutting of prices; up to a point this will be to the advantage of the buyer, but presently in order to compete with their rivals manufacturers will be tempted to modify their methods of preparation and this may be done to the detriment of the drug which they are making. Furthermore, there is at the present time nothing to prevent anyone putting any brown-coloured soluble powder into ampoules, labelling it with the name of any non-proprietary pentavalent antimony compound, and selling it to the public at a huge profit.

Surely it is time that legislation were introduced to protect both the public and the conscientious manufacturers! It would not be necessary to lay down very rigid standards, but it should be insisted that a preparation is what it purports to be. If it has a known chemical formula, the percentages of the constituent substances should be approximately correct and the toxicity should not be greater than that of the

pure substance. In the case of proprietary compounds, the toxicity and the percentage of constituent substances should be approximately that which the manufacturers specify and should not be allowed to vary in different batches.

In the meantime we can only repeat our advice of three years ago, that "the public, and more especially the medical profession, should be warned against using any preparations that have not had a very thorough clinical trial by a disinterested observer at some well-recognised institution," and we might now add, "and that do not bear the name of some reputable firm of manufacturing chemists."

ERRATUM.

In the November Number "A Case of Eclipse Blindness" was contributed by Kidar Nath Dutt, L.S.M.F. (Punjab), Canal Dispensary, Chanda, S. V. P. (Bahawalnagar) and not by S. C. Sen Gupta, L.M.F., etc.

SPECIAL ARTICLES.

NOTES FROM AN OPHTHALMOLOGIST'S LEAVE DIARY.

By R. E. WRIGHT,

LIEUTENANT-COLONEL, I.M.S.,

Madras.

DURING the past year I was fortunately enabled to visit a number of well-known ophthalmological clinics in the West and although a detailed account of my experiences which might appeal to the eye specialist would prove tedious to most readers, it may be of interest to record some of the more striking points which presented themselves and which may stimulate reflection on the advances of ophthalmology in certain directions.

BARRAQUER'S OPERATION.

Prof. Barraquer's clinic at Barcelona was naturally a centre of attraction. Of late years one has heard and read so much of phacærisis, which he has placed on a practical footing, that to see the originator of the method at work in his own clinic was eminently desirable; the more so as I had essayed to give his method an extended trial shortly after its introduction and had published a considerable series of cases in an article which was not optimistic as to the extended applicability of the method to an Indian clinic (*British Journal of Ophthalmology*, 1925). I quite realized that the method might prove a very valuable one in India in selected cases and briefly stated the case for extending this procedure in our cataract treatment here (*G. O. H. Report*, 1926). A further careful study of a series of 50 cases was made (Green's method) early in 1927 with Dr. Koman Nayar, the analysis of which was presented at the Oxford Ophthalmological Congress in June last (*vide Trans. Oph. Soc., U. K., 1927*).

I was fortunate in having Major Dick, Professor of Ophthalmology, Lahore, with me at the time of my visit. Prof. Barraquer afforded us every facility for seeing his work and I may say at once that we were both greatly impressed with what we saw. I

must omit the many interesting features of his excellent institution which appealed to one. It will suffice to say that it is stamped with up-to-date efficiency in practically every branch of ophthalmological science which it touches, and the perfection of organization and administration of this large private clinic stimulated one's envy and admiration. Phaco-onsis was the chief object of our visit, but even in this connection my remarks must be strictly limited.

The patient is carefully examined and prepared, the conjunctiva treated till surgically clean, sedatives are given, bromides for 3 or 4 days, and Sedol or Pantopan immediately before operation. The theatre ritual is exacting, almost formidably so, as compared with most other eye clinics the world over. The pupil is dilated, the orbicularis infiltrated with novocaine, a conjunctival flap is used, one mesial suture is always inserted, and two lateral ones if considered necessary. Barraquer's needles and suture materials are the finest in use, and the delicacy of his tackle is in contrast to that of very many operators. He does a peripheral iridectomy before tumbling the lens and having tied the conjunctival sutures, places eserine ointment in the lower sac, stitches the lids together, skin surface to skin surface near the cilia, applies half per cent. perchloride of mercury ointment to the lid margins and puts on a simple gauze wool strapping dressing. Subsequently, the patient is placed in a semi-recumbent position and allowed to move on the second day. In the few cases I saw the eyes presented a wonderfully quiet appearance on the fourth day with a full chamber, a round active pupil, and presumably quite safe and comfortable, going about the home with only a shade.

The technique in good hands is undoubtedly adapted to the removal of the lens in its capsule with a minimum of trauma to the vitreous face, it affords possibilities of a low iris-prolapse rate, and a relative freedom from vitreous adhesions to iris and section. Such considerations are, to my mind, of far-reaching importance in any procedure for removing the lens in its capsule.

FOCAL SEPSIS AND EYE DISEASE.

The so-called "focal" infections of the eye have claimed the attention of many ophthalmologists, but beyond those which are apparently associated with teeth, tonsils or sinuses, there is much speculation and little in the nature of proof. With such a vast area as the alimentary canal for the collection of harmful products, both chemical and organismal, and the transmission of such to the blood-stream and hence to the eyes, this source of trouble must be considered. Although examples of infection of the eye from the former sources are familiar to most ophthalmologists, as clinical associations if not actually proven bacteriologically, the conception of focal sepsis of such origin has come to occupy a position which is perhaps out of proportion to the recorded facts. One hears for instance of wholesale removal of a patient's teeth on account of incipient

cataract. Very often the cure is more pernicious than the disease. In cases of unilateral disease with a local focus there is considerable excuse for such measures, but when one comes to think of conditions such as bilateral cataract, glaucoma, or uveitis as due to focal sepsis, it is unreasonable to confine one's attention to teeth, tonsils or sinuses when the whole alimentary canal or respiratory system is not above suspicion.

Col. Kirkpatrick emphasised the rôle of the bowel in certain forms of chronic iridocyclitis here. I have also been particularly interested in this question for some time, but with a few exceptions have never satisfied myself even clinically that definite pathological conditions of the alimentary canal could be positively associated with eye disease. Even the dysenteric iridocyclitis described in the Mediterranean area during the War does not find a place here in our diagnoses. One of the possible exceptions which I have mentioned elsewhere is interesting, namely, the curious moonstone-like cataract frequently seen in bad hookworm infections. It is not maintained for an instant that it is due to the presence of hookworm; indeed, similar cataractous changes are seen in other intense anæmias, but it is a more definite association than, for example, cataract and dental infection, not even excluding the ubiquitous pyorrhœa alveolaris. On the other hand, in heavily infected districts such as Cochin, there does not seem to be an undue excess of cataract amongst adolescents. Similarly, I had come to regard a certain type of quiet iridocyclitis as associated with alimentary disease.

In discussing this subject with some of my colleagues late in 1926, the idea of intestinal lavage was propounded as perhaps being just as efficacious as radical teeth, tonsil or sinus procedures. The question arose as to how to put such a method into practice. The administration of voluminous draughts of normal saline to wash out the whole tract, as is sometimes practised for hyperpiesia, was suggested, but it was not always practicable even with intelligent patients. Then the idea of introducing an Einhorn's tube was considered and in turn the Plombière douch. My veterinary friends demonstrated the method of washing out dogs from anus to mouth by merely holding them end up and introducing a nozzle with a small head of pressure. By this means an unlimited amount of fluid may be run straight through with apparently little discomfort to the animal. Parasites come tumbling out, tape worms with heads complete, hookworms and so on, and the dog gets a new start with a clean alimentary canal. This much impressed me with the desirability of finding out what could be done in this respect in the human, for when one remembers the enormous area of the intestinal canal, even if we except conditions of stasis with an undamaged mucosa as not likely to lead to the absorption of harmful products, chemical or organismal, we, in India, have to consider this area extensively

damaged by the dysenteries, malnutrition, or parasitic traumatism, as a possible source of sepsis not less important perhaps than infections of teeth, tonsils or sinuses. I determined while on leave to make some enquiries on these matters.

A visit to a leading British spa showed me that although there was a firm belief in the association of alimentary disorders and the various groups of rheumatoid affections, little had been accomplished by bacteriologists and chemists to put the matter on a scientific footing. Enquiries into the methods of intestinal lavage did not get me further than demonstrations in the high Plombière method of donching out the large intestine. One curious negative observation in this connection was the relative paucity of uveal infections in a hospital for the treatment of chronic rheumatic affections (I refer to the Royal Bath Hospital, Harrogate).

I was subsequently enabled to discuss this matter with Dr. J. Wheeler, Professor of Ophthalmology, New York University, and through his kindness with two professors of medicine, Drs. Coleman and Max. Einhorn. The last-named was inclined to the view that the unimpaired alimentary mucosa was not a likely source of trouble in connection with obscure involvements of the uvea. For instance, he considered that the evil effects of alimentary stasis and constipation were unduly stressed. His investigation into the condition of the alimentary canal, more especially with regard to ulceration of the upper parts of the tract by means of his well-known duodenal tube, were extraordinarily interesting and instructive. As a result of a visit to his clinic one felt that should one ever be unfortunate enough to develop a gastric or duodenal ulcer, the comparative comfort of his apparently effective treatment would be preferable to more drastic surgical measures. Although the Einhorn tube may be introduced by the mouth and passed the whole way through to the anus, it is not adapted to giving man a complete wash through.

It is hardly necessary to remind the reader that a normal intestinal mucosa in adults of the hospital population in India must be rather exceptional. What with the various parasitic worms (chief amongst which is the hookworm), the dysenteries and the changes produced by affections of the deficiency group, there would appear to be ample facilities for even organismal invasion of the blood-stream. Apart from metastatic involvement of the eye, which he had not investigated particularly, Dr. Coleman considered that invasions of the blood-stream by alimentary organisms was a definite factor in disease and in co-operation with Burbank he had interested himself in it for a considerable time. Hadio-poulos and Burbank have recently produced experimental evidence of infective arthritis in animals, due to organisms isolated from the alimentary canal (*Journal of Bone and Joint Surgery*, 1927).

It is here, perhaps, well to consider what the term focal sepsis, when used in connection with the eye, connotes. In the grosser forms of endocular inflammation such as acute iritis, one may be dealing with either a bacteriæmia or toxæmia. In the first case, the local infection may be part of a general organismal invasion, e.g., syphilis, tuberculosis or leprosy, in which the actual organisms may be demonstrable in the tissues of the eye, or of a selective infection where the supposed organisms carried in the bloodstream have a special affinity for some of the eye tissues. I say "supposed organisms" designedly for sympathetic ophthalmitis may be an example.

It must strike many observers as somewhat curious that amongst the large clinical group of endogenous inflammations (infections?) of the eye, it has not been possible more often to demonstrate organismal invasion. This may be on account of the difficulty in prosecuting a bacteriological investigation in this important organ. One does not lightly undertake an exploration of the interior of the globe in order to make cultures from materials so collected and thus prove the matter. In 1926, I was enabled by means of a grant from the Indian Research Fund Association and with the assistance of Mr. Theodore of the King Institute, Guindy, to undertake cultures from a large series of tissues removed from eyes at the time of operation. Our results are published in the Report of the Governing Body of the Indian Research Fund Association, 1926-27; they were negative. We had hoped to find some known organisms or perhaps some organism as yet undescribed in eyes either blatantly diseased or in a condition of latent infection. It was finally considered that the whole question of suitability of media would have to be reconsidered before pushing the investigation further. The chief endogenous organisms which have been so far isolated from or demonstrated in the eye tissues are those of syphilis, tuberculosis, leprosy, gonorrhœa and cerebrospinal meningitis, and *streptococcus viridans*.

With regard to toxæmias, here again the question must be considered as at least a two-fold problem. The toxin (?) circulating in the blood may prove injurious to the eye in general with the other parts of the body, e.g., as in arteriosclerosis, or it may have a special selective action on the intra-ocular tissues, and many think that tuberculosis is commonly an example. The toxin may even be developed locally as in the so-called iritis phakogenetica, where the products of lens krystallin degeneration (or chemical alteration) set up an irritative iritis. Naturally there may be hypersensitivity either in the organ or the individual.

One would think that the term focal sepsis ought to be restricted to localized areas of disease, determining pathological changes in distant or non-contiguous tissues by virtue of either the transportation of the causative virus or the toxins produced by its action. Ordinarily, the

term focal sepsis is used in connection with teeth, tonsils and sinuses, but here the majority of proven instances in my experience are of the nature of local spread along blood or lymph channels and generally unilateral, so much so that unilateral uveitis in a patient without any of the great systemic infections is more apt to have the focus close by. Again we do not usually start to discuss focal sepsis in ætiology until we have ruled out syphilis, acute gonorrhœa, or acute infective fevers like relapsing or rheumatic. Leprosy is not spoken of in connection with focal sepsis, but a localized distant area of tuberculosis or chronic gonorrhœa is. So that we use focal sepsis in current parlance in a mixed sense (1) where a hypothetical seat of disease of unknown area, location and cause is the possible source of the trouble under investigation, and (2) where an adjacent or distant localized area of known disease is the starting point, e.g., a frontal sinusitis or a localized area of pulmonary tuberculosis.

Abnormal chemical constituents in the bloodstream (or even the lack of normal constituents) may determine local eye changes which, in our ignorance, we are apt to ascribe to some particular diseased area elsewhere. If the eye trouble is not recognized as a clinical type, we turn to the possible foci and eliminate them, sometimes drastically. Should the condition abate, we claim a *propter hoc* result. Some of the radical procedures are harmless, e.g., tonsillectomy, others lamentable, such as the wholesale removal of teeth at present fashionable in some centres of learning. The removal of the large intestine has fortunately had a limited vogue. If we try to work back from the eye towards the source of trouble, we are faced straightaway with the possibility that apart from metastatic endocular conditions, the endothelium of the uveal capillaries may have done those things which it ought not to have done, or left undone those things which it ought to have done. If this is vague, it is no more vague than going further afield and blaming, for instance, chronic intestinal toxæmia. At least a method is available (that of Marx), which claims to determine whether the endothelium of the eye capillaries is functioning normally.

Of late the work of Duke-Elder has enabled us to think more concretely about the rôle of the capillary endothelium in its relation to the regulation of the fluid content of the eyeball. Numerous ophthalmologists had speculated in this field, and felt convinced that in primary glaucoma we were gradually being driven back to an ætiology which was determined by chemical changes in the vitreous, but it required especial training in methods of experimental research, associated with an intimate knowledge of physics and chemistry to deal with questions affecting the electro-dynamic equilibrium in the capillaries and surrounding tissue fluids in the way he has done, and to state the case for and against in scientific, unambiguous terms. It remains for the expert biochemist

and physicist with special ophthalmological training or the co-operation of an ophthalmic surgeon to try to elucidate similar complex problems, as for instance the determination of blood chemistry, intraocular chemistry and the changes in the intermediate capillary endothelium associated with the formation of senile cataract. This condition at present is but a name like primary glaucoma; we use the word senile to cloak our ignorance, for sensility *per se* does not produce cataract.

It is obvious, I think, that when we talk of focal sepsis as productive of certain eye conditions, we are hardly scientific unless we establish a fairly constant association clinically with a fairly constant beneficial result following our attack on the supposed focus in toxæmias, or, alternatively, unless we establish a definite bacteriological proof in endocular infections. In spite of enquiries and observations during the period of my trip West, it was disappointing to note that there is very little good evidence in favour of the obscure chronic infections of the uvea or other parts of the eye owing their origin to the so-called focal sepsis of alimentary origin.

TEACHING OF OPHTHALMOLOGY IN AMERICA.

One of my chief reasons for visiting the States was to see to what extent the teachings of Duane and Jackson in connection with refraction and muscle balance had influenced practice there. My intention of going might never have been fulfilled had it not been for the invitation of my friend Dr. John Wheeler, Professor of Ophthalmology, New York University, to whom, for his kindness and hospitality, I am deeply indebted. He not only allowed me to see his own work but made it possible for me to meet and see the work of numerous other distinguished ophthalmologists. It would be invidious to mention here the names of all those to whose generosity I am indebted; I can but acknowledge the unfailing courtesy of all those ophthalmologists with whom I came in contact.

In the time at my disposal I was able to visit New York, Washington, Boston, Baltimore and Philadelphia, and thus see something of ophthalmology as taught and practised in the Eastern States. I may say at once that in general the teaching and practice of refraction work and that in connection with the external muscles of the eye is considerably in advance of similar teaching in England and on the continent of Europe, although the practice sometimes falls short of the teaching. These subjects constitute by far the greater part of the ordinary ophthalmologist's daily work and it is of the utmost importance that a correspondingly large amount of his early training and subsequent study should be devoted to them. It is surprising how much time is spent even by distinguished ophthalmologists on the elaboration of some minor point of operative technique which has probably been in use elsewhere for years, or the invention of some superfluous instrument, to the apparent neglect of the more common and difficult but

more important problems in connection with errors of refraction and muscle balance.

The treatment of heterophoria and heterotropia is carried out along sound straightforward lines and operative work on the extrinsic muscles is freely practised for anomalies of convergence and divergence, elevator spasm and so on with excellent results, cosmetic and symptomatic. The technique in connection with muscle operations, such as recessions and resections, as practised in the leading clinics of New York is uncomplicated and efficient. In my opinion, time spent on refraction and such subjects with the undergraduate is mis-spent unless the particular undergraduate intends to take up ophthalmology as a specialty. This difficult branch of ophthalmology can only be mastered by prolonged study and practice, but naturally it is a great boon to the graduate who wishes to specialise in ophthalmology to obtain systematic teaching of an attractive and practical type rather than to spend years of work in a hospital refraction-room finding things out for himself.

Ophthalmology is a subject which, except for a few lectures and demonstrations, might readily be cut out of the modern undergraduate curriculum to make way for some of the newer departments of the basic sciences. It is a post-graduate subject but essentially one in which no deep knowledge can be acquired without an exceptionally good ground work of the basic subjects which there is hardly time to absorb in the course of the modern curriculum. It is necessary, therefore, even in the post-graduate teaching of ophthalmology to cater for anatomy, physiology, pathology including their foundations and their correlated subjects.

One of the finest courses of post-graduate teaching in the world, possibly the finest in several branches, is carried out in the Graduate School, Philadelphia, where a full course of three years is available under distinguished ophthalmologists who have carefully organized the teaching of the various subdivisions of the specialty. This course appears to me to be superior to any organized in England of recent years, in fact to any I have seen elsewhere. In illustration of the value of this teaching, I might perhaps mention two recent works which are the outcome of its organization and which will give an idea of the way in which some of the subjects are dealt with. I refer to "The extrinsic muscles of the eye" by Peter and "An introductory course in ophthalmic optics" by Cowan. The latter particularly shows how a difficult, and, to the ordinary eye specialist, uninteresting subject may be taught in an attractive way. As regards physiology those who keep in touch with current ophthalmic literature will be familiar with the work of Dr. Adler. I am indebted to the kindness of Dr. de Schweintz for bringing me in contact with many of the teachers in this school and with the department of ophthalmology in the University of Pennsylvania, where he formerly held the chair now occupied by Dr. Holloway. It will be obvious,

without further mention of subjects or names, what an important position the Graduate School of Philadelphia occupies.

PLASTIC SURGERY.

The plastic surgery of the lids and socket as carried out by Prof. Wheeler of New York is in a class by itself both in design and execution. It makes the work of Gillies which has excited the admiration of many, appear crude in this field (and I have had the opportunity of seeing both). His whole skin grafts to replace a lower lid are practically invisible in a fortnight. His technique for the reconstruction of a badly contracted socket is, in his hands uniformly successful. If Dr. Wheeler has made this field all his own, it is not to the exclusion of other important branches of surgical and medical ophthalmology. To have had the opportunity of following his work daily for a considerable period is an experience which it would be impossible adequately to record. The soundness of judgment embodied in his teaching was salutary, particularly in the adoption of a conservative attitude in connection with certain operative procedures where the best interests of the patient were served by some safe alternative. I understand that he is shortly to become Chief of the Clinic of the Ophthalmological Department of the new Medical Centre in New York, probably the largest centralized group of medical clinics in the world.

INTRACAPSULAR EXTRACTION.

Prof. Knapp's demonstration of his technique for removing the lens in its capsule left the impression that it was a simple and safe way of performing intracapsular extraction for those who consider that the Smith technique offers greater possibilities of trauma or who have not mastered the Barraquer procedure. It has been modified by many and is similar to that advocated by Prof. Sinclair of Edinburgh. Like the Smith and Barraquer techniques, it has a limited field of applicability. I believe every case of cataract must be taken on its merits. There is no universally suitable technique for the treatment of cataract if we appreciate what safety first must mean to our patients.

TRACHOMA.

The Rockefeller Institute is one of the great attractions to the medical man visiting New York, especially so to one from the tropics with a longstanding interest in bacteriology and tropical research. As an ophthalmologist what I wished to see most was Noguchi's work on trachoma; as a part-time research worker I was much more interested in the man himself. He very kindly gave me a whole morning although busy packing up for West Africa. He sailed a few days later never to return; the loss to medical science caused by his death, as by that of Stokes, who preceded him in that field, is inestimable. He explained how the idea had occurred to him

of getting successful transmission to the chimpanzee through cultures from trachoma cases rather than by direct transmission. At first it had seemed almost foolish to think that one of the very ordinary-looking organisms plated out from Indian (American) trachoma would produce any result when implanted on the conjunctiva, but in due course one of the isolated organisms, a short flagellated rod, did produce the appearances which he then demonstrated to me on the conjunctiva of the chimpanzee. Moreover, he was able to recover the same organism from the animal's conjunctiva, and the animal infected on one side transferred the disease to the sound eye.

The lesions in the chimpanzee were certainly indistinguishable from what many ophthalmologists would term trachoma and under the microscope the appearances were also similar. Some histopathologists no doubt might cavil at the preparations, but personally I was not inclined to do so as after long intimacy with sections of trachoma I have come to the conclusion that as yet there is no pathognomonic histopathological appearance in this disease or group of diseases.

Dr. Noguchi invited criticism, but it was obvious to me that the only efficient criticism was the confirmation of his work in other parts of the world. He had at all events definitely established the fact that organisms cultivated from human trachoma cases could produce a similar condition in not only the chimpanzee but *rhesus*. He considered the implantation with the cultured organism the key to the problem. In repeating his work, it would be necessary to acquire his technique with semi-solid media. For this I regret there was no time although I was anxious to make another attempt to investigate trachoma in India along Noguchi's lines in view of the negative results which Cunningham and the writer obtained in 1922 with direct implantation on the conjunctiva of the monkey (*simicus*), and into the subdural space and testicle of the rabbit.

TISSUE CULTURE.

Dr. Kirby, whose work on the growth of the lens epithelium *in vitro*, will be known to most ophthalmic specialists (*American Academy of Oph. and Oto-Lar.* 1926), introduced me to Dr. Carrel in connection with whose department in the Rockefeller Institute this work had been fostered. He was also investigating the artificial production of choroidal neoplasms in chick embryos. The technique of growing living tissues *in vitro* is fascinating, but it would be impossible to go into the various aspects of the subject which interested me. Dr. Carrel kindly gave me a morning in his laboratory and explained the various types of technique. He discussed modes of cell growth, the nature of fibroblastic proliferation, the fibroblast and the macrophage, all of exceeding interest and importance from the point of view of histopathology. (Those interested might refer to the *Journal of Experimental*

Medicine, 1926.) He showed me sub-cultures from his original tissue growths which, it will be remembered, stimulated such universal interest in the English-speaking world when they were successfully started before the War. He is confident that work along the lines to which he had devoted himself will, at no very distant date, result in the elucidation of the cancer problem.

Cell growth *in vitro* and observations on the capillary circulation is a subject which has claimed considerable interest of recent years and rightly so, inasmuch as appearances which are seen under the microscope in fixed tissues or in tissues growing under artificial conditions are so liable to misinterpretation. It is of the greatest importance to the pathologist to know where the various cells concerned in repair processes come from, their relation to the endothelial elements of the blood and lymph vessels and the rôle of the different white blood cells and connective tissue cells in this respect. To the physiologist no less than to the pathologist, the behaviour of the capillaries is of intense interest.

In this connection, I was fortunately able to see something of the work of the Clarks and Sandison of Philadelphia which bids fair to overthrow some of the conceptions formed as the result of Krogh's classical researches (see *American Journal of Anatomy*, 1925-26). The technique of the Philadelphia workers is adapted to the observation of mammalian rather than reptilian tissues. The method adopted of implanting a transparent double-walled cell composed of two coverslip-like pieces of transparent material open at the sides, with a space between of 5 μ like a double window, in the ear of a rabbit, so that the living tissue is enabled to grow in between the faces of the cell, is one of the most ingenious pieces of technique I have ever seen. The animal's ear can be placed on the microscope stage and the behaviour of the tissues inside the transparent cell observed with the oil immersion lens. Continuous observation over prolonged periods, 24 to 48 hours, are thus rendered possible by two observers working and resting alternately. Under these circumstances, the behaviour of the capillary flow, of the endothelium of blood and lymph vessels, and of the so-called fixed connective tissue cells and Rouget cells may be continuously observed. The haphazard behaviour of the red cells in the capillaries reminds one of the appearances seen with the corneal microscope, with the movement sometimes in one direction sometimes in another, as if the stream velocity varied with the condition of the surrounding bed. Capillary contractility is apparently independent of Rouget cells or other adventitious cells and is a property of the endothelial wall. It was somewhat upsetting to have old beliefs, such as the power of the capillary endothelium to form fibroblasts, endothelial leucocytes, tissue macrophages, and foreign body giant cells, badly shaken. When the researches of these workers on the mammalian capillaries and cells (as distinct from the

reptilian) is concluded, it will form a great advance in our knowledge of tissue changes.

BRAIN SURGERY.

The ophthalmologist of to-day is, or ought to be, in a position of indispensable co-operation with the neurologist and brain surgeon. Through Dr. Derby's kindness I was enabled to pay a visit to Prof. Harvey Cushing's clinic at the Peter Bent Brigham Hospital, Boston, which emphasised the great importance of careful fundus examinations and field-taking to the brain surgeon. In an ophthalmic clinic of this kind where large numbers of brain tumour cases are dealt with, it is essential that the assistants should be expert ophthalmoscopists and capable of undertaking careful quantitative perimetry, and this is so. Dr. Cushing, Professor of Surgery, Harvard Medical School, kindly allowed me to see not only his technique but definite types of tumour or tumour-equivalent cases in the wards, and to examine their eye grounds. One could not help feeling on coming away from this magnificent embodiment of organized clinical research how far we have to go in this respect in India. As yet we are not in sight of the threshold. Numbers of cases such as I saw at the Peter Bent Brigham Hospital find their way to the ophthalmologist. Here I see relatively large numbers but one can do little or nothing for them because as yet we have no organization capable of dealing with brain surgery. The work of Cushing and his collaborators on the aqueous, as an analogical study undertaken in connection with their work on the cerebrospinal fluid (*Journal of Medical Research*, 1914 *et seq.*), led me to make enquiries along these lines. It is hardly necessary to go into this matter now as it would appear that Duke-Elder's recent researches have probably eclipsed this older work.

OTHER CLINICS.

In a visit to Boston in search of new ideas in ophthalmology, the centre of interest was naturally the Massachusetts Eye and Ear Infirmary. The activities of this well-known clinic, such as Dr. Derby's light sense research in the pre-glaucomatous eye, Dr. Verhoeff's pathological investigations, and Dr. Lancaster's work in the field of refraction, will be familiar to readers of ophthalmic literature. A brief, but highly instructive personal introduction to some of Dr. Verhoeff's wonderful material reminded me by contrast that the teaching of ophthalmological pathology had not appeared so prominent as many other post-graduate subjects. Apparently Vienna still holds almost a monopoly in the post-graduate teaching of this subject, but there would not appear to be any need for Boston students to wander far afield. I think post-graduate pathology suffers and has always suffered from the fact that it absorbs an immense amount of ill-paid time and effort and consequently it requires

a special and somewhat uncommon mentality of its devotees.

Some readers may not recollect that in the Massachusetts General Hospital, Boston, may be seen the room in which ether anaesthesia was first administered for a surgical operation and the actual sponge used on that memorable occasion. Close by in the clinic of Dr. Ayer a more modern procedure claimed my attention, namely, the method of cistern puncture as a diagnostic procedure. This technique not only enables one to gain more important information with regard to cerebrospinal fluid than lumbar puncture, but may also be used for the subarachnoid introduction of drugs in the treatment of intracranial affections associated with lues. Articles in connection with the latter subject have appeared in the literature during the last few years. Cisternal puncture, once the method is acquired, is no more dangerous and less trying to the patient than lumbar puncture. The two procedures, together with explorations of the posterior horns of the lateral ventricles under local anaesthesia through drill holes in the occiput, constitute valuable clinical methods in the investigation of conditions in which secretion, circulation or elimination of the cerebrospinal fluid is interfered with, and ought to be available in large clinics here.

Dr. Wheeler kindly arranged a personal demonstration by Dr. Uribe Troncoso of his new instrument for examining the angle of the anterior chamber, the gonioscope. It is difficult to judge of its value without prolonged observations, and so far the inventor has not published any extended work on its value as a diagnostic aid. It is certainly not so easy to use in ordinary cases as an instrument like the ophthalmoscope for it necessitates a contact glass on the cornea and all that this entails.

The photography of the eye grounds as a means of maintaining permanent records of changes which take place in the fundus has become an established clinical method. Although this procedure has been on a practical footing for a considerable time, it is only within the past few years that it has been taken up with any degree of enthusiasm by eye specialists. The various apparatuses now on the market, although expensive, are essentially practical and the method is useful not only in clinics, but also in private practice. The method will, no doubt, in the future occupy a permanent place in the literature in connection with eye ground records although in centres where ophthalmoscopic artistry is available (e.g., Hamblin's, London), it will be cheaper and more satisfactory for the specialist to send his private patient from time to time to have an accurate picture in colour made of the fundus.

The New Wilmer Ophthalmological Institute of the Johns Hopkins Hospital was in the making when Dr. Wilmer kindly extended his hospitality to me in Baltimore. It was interesting to see modern ideas with regard to practice,

teaching, and research applied to the organization and construction of the ophthalmological section of this great seat of learning. Dr. Wilmer, like a number of distinguished ophthalmologists, is a great believer in many of the obscure pathological events in the eye having their origin in a tuberculous infection elsewhere. It must be admitted that numbers of cases of endophthalmitis of one sort or another which are vaguely put down to focal sepsis have a tuberculous lesion somewhere in the body and appear to respond to anti-tuberculous measures. I was interested to see that specific therapy is used very very carefully. I have always regarded the specific therapy of ocular tuberculous lesions as a thing apart. Eyes may be rapidly lost if one carries out the ordinary methods advocated in the treatment of tuberculosis in other parts of the body.

All the latest mechanical aids to diagnosis are incorporated in this institution, which will be largely devoted to research, surgical, biochemical, physiological and pathological. The staff of workers had been collected and when I left, it only remained to have the various departments housed. Already work had begun and important papers had been issued, as for instance that of Woods and Burkey, on lens protein and its fractions. These authors found that α krystallin and β krystallin showed organ specificity just as whole lens protein, and they produced serologically pure fractional antigens. Under certain circumstances, the β krystallin undergoes spontaneous precipitation with resultant clouding of the lens; this is ordinarily prevented by the integrity of the α krystallin.

One cannot but notice the value of the social systems which co-operate with some of the great eye hospitals overseas. That in Boston particularly claimed my attention. Here, the social workers' organization was an integral part of the hospital system, and was housed in the hospital buildings. The follow-up system was elaborately arranged and house-to-house visiting enabled medical relief to be continued and applied not only in the case of the actual patient, but also to the other members of the family. For instance, cases of interstitial keratitis were kept under observation in their own homes, the parents were approached and the whole matter explained to them sympathetically, and lines of procedure were suggested.

NATIONAL INSTITUTE FOR THE BLIND.

I will conclude with a reference to the National Institute for the Blind, Great Portland Street, London. The Secretary kindly explained to me the system under which the care of the blind was organized in England and Wales. The elaborate machinery which has been evolved deals with a blind population of approximately 47,000 (about 70 per cent. of these are unemployable) and about £1,000,000 per annum is available for their welfare. Of this more than half is raised by voluntary subscriptions, the Ministry of Health and local bodies being responsible

for the rest. There are a number of institutions all over the country both for primary education, secondary education and industrial training. The institute in Tottenham Court Road is an example of the latter. Here one sees such instances of useful training as that of a man blind, deaf and dumb earning £2-10-0 per week. This institution does not nearly pay its way, as blind labour cannot compete with sighted labour. The staff of both voluntary and paid workers is naturally very large. It was pleasing to see that amongst those doing voluntary work of immense value were retired members of the Indian services.

It would seem that in India where there is crying need for organizations to deal with our blind, the great difficulties to be faced are lack of funds for the large blind population which, according to the Census report of 1921, amounts to 37,162 in the Madras Presidency alone; and lack of experienced administrators as voluntary workers willing to give up a large part of their time to this cause. If we take 70 per cent. of the Madras Presidency blind to be unemployable, at present the existing institutions do not deal with more than 2 per cent. of the remainder, and the voluntary subscriptions for this work do not amount to £2,000 per annum.

A NOTE ON THE EARLY HISTORY OF GRANT MEDICAL COLLEGE, BOMBAY.

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IN the year 1835, Sir Robert Grant, shortly after he became Governor of Bombay, directed his attention to the desirability of establishing a medical school in this Presidency. He was deeply interested in this subject. As a preliminary measure he encouraged the spirit of scientific enquiry amongst the medical officers of the Government, and so the "Medical and Physical Society of Bombay" had its origin. Early in 1837, soon after this Society was founded, the attention of its managing committee was directed by Government to the subject of medical education. A former medical school in Bombay, the earliest of its kind in India, was instituted by Government under Mr. Elphinstone, but after six years of unsatisfactory existence, was abolished when Lord Clare was Governor. This was brought to the notice of the committee of the Medical and Physical Society, and it was asked to submit its considered opinion on the establishment of a new school. This time was well fitted for the proceedings of Sir Robert Grant. The Bengal Medical College which was started in 1835 had been in operation in Calcutta for two years and had achieved marked success. The committee of the Medical Society reported favourably, and Sir Robert Grant drew up a very able minute on the subject of medical education

in the Presidency, which advocated the establishment of a new medical school in Bombay. This minute was transmitted to Calcutta, then the capital of India, about the middle of 1838. It was approved by Lord Auckland's Government, but before this news reached Bombay, Sir Robert Grant unfortunately died. A public meeting was held in the Town Hall of Bombay on 28th July, 1838, at which a resolution was passed that a medical college be established in Bombay, which should bear the name of Sir Robert Grant. The Honourable Court of Directors of the East India Company sanctioned the scheme, and authorized that the proposed school be called Grant Medical College.

The fund subscribed by the public for this amounted to Rs. 44,800. The Court of Directors contributed an equal sum to defray the cost of the building. At last the foundation stone of the College building was laid on 30th March, 1843, by the Lord Bishop of Calcutta. It was completed in 1845, when it was handed over to Dr. Charles Moorehead, the first principal of the College, whose portrait is in the College Gallery.

With the College a teaching hospital was necessary. In 1838 Sir Jamsetji Jeejeebhoy offered a sum of Rs. 1,00,000 on the condition that the Government offered an equal sum, the income from which was to be expended on a hospital for the treatment of the sick poor of all denominations. This proposal was submitted to Government shortly before the transmission of Sir Robert Grant's minute to Calcutta, and was noticed in a postscript to the minute, as calculated to facilitate the arrangements for the medical school. The Court of Directors acceded to the wishes of Sir Jamsetji Jeejeebhoy and the committees which were to work out the details of Grant Medical College were also required to consider those of the proposed hospital, and to point out the most advantageous way of connecting the two institutions. As a result of this, it was finally determined to build the hospital in close proximity to the Medical College, and to designate it the Jamsetji Jeejeebhoy Hospital. The foundation stone of the hospital building was laid on 3rd January, 1843, with masonic honours by R. W. the Provincial Grand Master of Western India, Dr. James Burns, K.H. The building was completed and was opened for the reception of the sick in the month of May 1845. The Indian General Hospital which was in existence before, was abolished, and its inmates were transferred to the new building.

Thus the College and the Hospital having been constructed, the curriculum commenced on 1st November, 1845, with 12 students. Drs. Charles Moorehead, John Peet and H. Giraud were the first three members of the staff, each in turn occupying the chair of the Principal.

The Memorial tablet in the main College Building bears the following inscription:—

"In the year of Our Lord, 1845, in the Reign of Her Most Gracious Majesty Queen Victoria,

under the Government of The Right Hon'ble Sir George Arthur, K.C.B., this building was erected at the Joint Expense of the Honourable East India Company and the friends of the late Sir Robert Grant, G.C.B., Governor of this Presidency, for the purposes of an Institution designated in honour of that Distinguished Statesman, the Grant Medical College, and designed to impart through a Scientific system the benefits of Medical Instruction to the Natives of Western India."

Its subsequent history for the last 83 years bears ample testimony to the fact that it has faithfully and creditably fulfilled the wishes of its founders.

REFERENCE.

First Report of the Grant Medical College for the year 1845-46 by Dr. Charles Moorehead, M.D., F.R.C.P. (Bombay Education Society's Press, 1849).

Current Topics.

Sprue: An Analytical Study of 150 Cases.

By G. CARMICHAEL, LOW.

(The Quarterly Journ. Med., July 1928, p. 523.)

THE chief symptoms of sprue may be tabulated as follows:—

- (1) Loss of energy.
- (2) Loss of weight.
- (3) Dyspeptic distension of abdomen.
- (4) Morning diarrhoea. White frothy stools.
- (5) Sore mouth and tongue.
- (6) Anæmia, especially in the later stages.

Age.—The youngest case seen was 21, the oldest 75. Dividing up the ages into periods, the greatest number of cases occur in the middle period of life, broadly from 30 to 60.

Sex.—Many more males than females were seen, but I do not think that this means that the female is less susceptible than the male. The most likely explanation is that more males than females go abroad and consequently more of the former will be seen than the latter. In the series there were 112 males and 38 females.

Place of Infection.—The following table gives the details:—

China	..	..	..	27
Japan	..	..	..	1
Hongkong	..	..	..	4
Singapore	..	..	..	2
Manila	..	..	..	1
Federated Malay States	..	..	..	8
Penang	..	..	..	2
Burma	..	..	..	7
Assam	..	..	..	2
India	..	..	..	68
Ceylon	..	..	..	10
Bombay	..	..	..	7
Mesopotamia	..	..	..	1
East Africa	..	..	..	2
West Indies	..	..	..	1
Barbados	..	..	..	1
British Guiana	..	..	..	2
Mexico	..	..	..	1
Fiji	..	..	..	1
North Queensland (Australia)	..	..	..	2
				150

Previous Illnesses.—In 91 of the 150 cases, 61 per cent., a history of some debilitating illness was obtained. It is true that in many of the cases this had been acquired

some years before the symptoms of sprue developed, but in others a definite relationship between the two could be traced. There does seem to be a connection between the different forms of dysentery, hill diarrhoea, and possibly enteric, as predisposing factors. In two cases typical sprue developed on the top of amoebic dysentery, the stools definitely changing from those of dysentery to those of sprue. Syphilis also co-existed in a good number of the cases, and there is a definite condition which appears in that disease and closely resembles real sprue. This pseudo-sprue yields to anti-syphilitic remedies. I have had six such cases, but they have not been included in the 150 cases analysed because they are not sprue. The following table summarizes the conclusions:—

Amoebic dysentery	..	..	15
Dysentery, including bacillary and other forms	..	..	17
Dysentery and enteric	..	..	3
Dysentery and malaria	..	..	10
Enteric	..	..	5
Malaria	..	..	14
Diarrhoea	..	..	3
Hill diarrhoea	..	..	6
Syphilis	..	..	10
Sandfly fever	..	..	1
Dengue	..	..	4
Gastric influenza	..	..	1
Ankylostomiasis	..	..	1
Cholera	..	..	1
			91

Tongue Symptoms.—The inflammatory condition—the pathological syndrome of the disease—very frequently attacks the tongue, giving rise to a clinical condition of glossitis or, as it is popularly known, "sore tongue." When this occurs the organ is red, inflamed, congested, and very painful, the epithelium is destroyed, and often minute vesicles or little ulcers are seen along its margins. Alcohol, condiments, etc., cannot be taken owing to the intense pain they produce, and the irritation produced by the lesions may cause a profuse salivation.

On recovery from the acute or subacute manifestations the epithelium is seen to be denuded, leaving the tongue smooth and bare. It is now an ordinary colour and no longer painful. Exacerbations are, however, prone to occur with a renewal of the inflammatory changes. Finally, when complete recovery takes place, a new epithelium is developed and the tongue becomes covered again. In cases complicated with syphilis transverse fissuring is often seen, and patches of leucoplakia may appear, giving the well-known silvery tongue. This often gives the clue to the mixed infection.

Of the 150 cases, 101 had tongue lesions when seen. The symptoms varying in intensity and appearance with the state of the disease. The smooth bald tongue was common in the chronic advanced cases.

In most of the others, with the exception of 14, there had been a history of sore tongue or mouth at some period of the illness. The 14 (9 per cent.) had never suffered from tongue or mouth lesions at any time up to the time of being seen.

Mouth Symptoms.—These are similar to those of the tongue, the principal lesions being small superficial ulcers in the buccal mucosa. Patches of inflammation and congestion are also seen, these spreading back to the pharynx and even down to the oesophagus. Of the 150 cases, 44 were noted as having mouth symptoms at the time of the examination. One cannot, however, draw any hard and fast distinction between tongue and mouth lesions, most patients having one or the other at one period of the disease, and often both together.

In the series oesophageal symptoms, as evidenced by pain in swallowing, soreness and the feeling of a raw surface down the gullet were specially noted in 4 cases.

The teeth are invariably bad in sprue, pyorrhoea and root sepsis being very common. The part this chronic septic absorption plays in keeping up, or even aggravating, the symptoms is very important.

Diarrhoea.—The diarrhoea of sprue is peculiar. One of the earliest, if not the earliest, symptoms of the

disease is that it usually comes on in the early hours of the morning—from 3 or 4 a.m. onwards—the patient having to get up once, twice, thrice, or even oftener before breakfast. After this the rest of the day is quiet with no trouble, but next morning a repetition of the same thing takes place. After this has lasted for some time the characters of the stools change: they become very offensive, frothy, and of a white colour, the usual brown pigment disappearing.

As time goes on, and especially if the patient is not treated, the diarrhoea becomes excessive and occurs throughout the day as well as in the mornings. Twelve to fifteen stools a day may be passed, and rapid wasting now takes place. On strict diet and treatment the diarrhoea may be checked and then the stools become solid again, but without any colour in them.

The absence of colouring is interesting. Bile is still secreted, but the colouring matter, the bilirubin, is said to be changed in the intestine into a colourless substance known as leucobilin or leuco-urobilin. This is synonymous with urobilinogen. It is interesting that one of the signs of a return to normal is the gradual appearance of colouring matter in the stools again.

A chemical analysis of sprue stools shows great excess of fat, with the fatty acids in excess of the neutral fat, this indicating that a certain amount of splitting is taking place and that there is no pancreatic insufficiency in the sense of absence of lipase, but rather the reverse. Apparently, however, owing to lacteal destruction this is not absorbed, and is passed in the faeces unchanged.

The amount of fat varies, but may be as high as 70 to 80 per cent., with the fatty acids in the proportion of 5 to 1 of neutral fat, or even higher, up to 10 to 1. This helps one in diagnosing sprue from diseases of the pancreas, where the neutral fat is greatly in excess of the fatty acids, indicating a failure of the lipase ferment.

No parasite helminths or protozoa are present, unless a mixed infection co-exists. The stools in the later stages of the disease tend to become very bulky, and food, if not of a proper nature, is passed undigested. The pathology of the disease explains the faulty assimilation that is taking place, for a large part of the intestine is out of action and cannot therefore absorb nutriment properly. Though careful and prolonged bacteriological researches have been conducted on the faeces in sprue, no specific micro-organism has been isolated. The possibility of a gastro-intestinal toxin as the cause of the disease cannot therefore

Out of the 150 cases a at some time or other, was obtained in 141. The majority actually had this when seen; others were in the remission stage, better for the time being, only to relapse again later; while others were convalescent and practically cured. In nine cases there was no definite history of diarrhoea, the tongue and mouth lesions, the wasting and blood changes, giving the clue to the diagnosis.

loss of weight. Here again the pathology explains this. Most of the absorbing surface of the small bowel is thrown out of action and the patient is being starved, though taking plenty of food. Finally, sufferers from sprue may become emaciated skeletons, with their ribs and other bones showing through the dry, atrophic skin with which they are covered. It was no uncommon thing for a man of 12 stone, say, to lose a quarter of his weight or more. Small people, especially women, may fall well under 6 stone. Loss of weight is constant and occurred in all the 150 cases. It was specially investigated in 100 of these, and losses of weight such as 4½ stone, 4 stone, 3 stone, and 2 stone were common.

Liver Dulness.—The liver is shrunken in sprue and the dulness to percussion is consequently diminished. This may be due to a special change in the liver itself, or only part of the general atrophy. Sokhey, Gokhall, Malandkar, and Billimoria (*Ind. Journ. Med. Res.*, XV, 1928, pp. 553–61) have studied thirteen cases to see if modern functional tests would throw any light on the efficiency of the liver in sprue. Their conclusions show "that in sprue the liver is not affected to such an extent as to show impairment by liver function tests." The following tests were employed:—Lævulose tolerance test, Van den Bergh reaction, nitrogen partition of blood, bromsulphalein dye test of Rosenthal and White (1925).

As has been said previously, bile is still secreted into the intestine. In the analysis, only 67 cases have been specially recorded as to the condition of the liver, but certainly, if looked for carefully, this shrinkage would be found to be commoner than the figures below indicate. Even then, 64 (42.2 per cent.) showed marked diminution of this organ.

Blood Condition.—In the early stages of sprue there may be no anaemia, but later, especially in the chronic cases, anaemia appears. In a certain type of case, which may be described as the "haemolytic type," a progressive loss of red blood corpuscles takes place, and a picture closely resembling pernicious or Addisonian anaemia develops. Many of these cases die with blood counts down to half a million reds per c.mm. or under. Though this is so, it does not mean that sprue is the same disease as pernicious anaemia, but it is possible that it is produced by similar causes, such as gastro-intestinal or other toxins. In the early and mild cases with little anaemia, the cure of the sprue cures the anaemia, and as long as the disease is cured or in abeyance the anaemia does not return. In the haemolytic types, however, even with apparent cure or at least amelioration of the symptoms, the anaemia may continue independently, and it is this class of case that resembles pernicious anaemia. The blood was investigated and counted in 114 of the cases: 7 cases were reported to have no anaemia, while 5 were reported anaemic but with no details of blood counts. An analysis of these counts shows the following:—

Under 1,000,000	1 to 2 Million	2 to 3 Million	3 to 4 Million	4 to 5 Million	5,000,000 or over	
1	7	14	43	45	4	= 114 cases

Flatulence and Abdominal Symptoms.—Flatulence with dyspepsia and gastric symptoms is one of the cardinal signs of real sprue. Due no doubt to the loss of tone in the intestine and the presence of many gas-forming organisms, this flatulence distends the abdomen until it becomes like a drum. It is very distressing and difficult to cure. In its absence the walls of the abdomen are seen to be soft and flabby, with little or no tone left in the muscles and with the panniculus atrophied away. This sprue abdomen is very characteristic. In the 150 cases there were 75 (50 per cent.) noted as having flatulence at the time of their examination. In fifteen definite abdominal pain was complained of, in four a general sense of discomfort only, and in one cramps in the abdominal wall.

Loss of Weight.—This may be taken to be a constant feature in the disease. No disease, with perhaps the exception of cancer, produces such a rapid and extensive

The leucocytes in sprue are about normal; where the anaemia is severe a leucopenia may occur, while in a few cases a leucocytosis may be met with, indicating some other infection.

Other Symptoms.—Symptoms other than those described as the classical ones of the disease were encountered in the series, some due to the disease itself, while others may have had little or no connection with it.

Of these, the following may be mentioned: Cachexia with pigmentation of face and skin; mental changes indicated by irritability of temper, fretful disposition, etc.; oedema of ankles and feet; pyrexia; dry skin; cramps in muscles and stomach; sudden vomiting (3 cases); appendicitis; hemorrhoids (common); petechial hemorrhages; stoppage of menstruation; auricular fibrillation; syncope attacks. Strangely enough, though tetany is described as a common symptom of sprue in all

text-books, it was not seen at all in the 150 cases analysed.

Treatment.—There is hardly any disease in which treatment is so important as in sprue, and unless the patient makes up his mind to undergo the drastic measures one has to adopt, there is no chance of curing the disease. Absolute rest in bed is the first essential, and no movements of any sort should be allowed for six weeks to two months. The patient must lie on his back and not get out of bed even to go to the closet. The bed-pan and bottle must be used. Diet is the second essential, and if one bears in mind the pathological lesions present in the intestines, then it will be apparent that, to begin with, the most easily digested and easily assimilated food must be employed, and in this respect nothing comes up to milk. The routine I adopt in sprue is as follows, and this was followed out more or less in all the 150 cases of the series.

It is best to commence with a comparatively small amount of milk until the diarrhoea and other acute symptoms disappear. Three pints of milk in the twenty-four hours will be found to be enough. The feeds should be given every two hours with the exception of 2 and 4 a.m., this making ten feeds a day, e.g., 6 oz. of milk per feed. On this alone the symptoms very quickly—almost at once in most cases—begin to improve; the diarrhoea ceases and the faeces tend to become solid. The weight, however, still goes on falling, as three pints of milk a day is not sufficient to maintain an adult's weight. Whenever signs of improvement appear, the milk should be gradually increased, and when amounts up to five pints are being taken and digested, the weight starts to go up. Progress as a rule now goes on without any untoward incident, and I gradually work up to a maximum of seven pints in the twenty-four hours. In small males and in females six pints may be all that can be digested. The total time devoted to the strict milk regime has generally been four to six weeks. If at the end of that time everything is satisfactory, then the gradual introduction of carbohydrates is begun. Sago or arrowroot may now be given. Later, eggs are started, first beaten up with the milk, then lightly boiled, then rusks and toast. By this time two months will have passed, and, if all is well, in the third month pounded fish, fruit in the form of bananas, pounded chicken, potatoes and spinach as a vegetable, may be given. A simple diet of this nature is continued as long as the patient is in hospital or in a nursing home, and then when leaving one should lay down a simple dietary which must be continued for the next six months at least. No irritating foods must be taken, absolutely no alcohol is allowed, and great caution must be observed against damp, cold, chills, and over-exertion.

Treatment has a marked effect on the blood. In early cases, as has been stated, there may be little or no anaemia. In later cases anaemia develops, but on drastic treatment being adopted this at once improves and the blood gradually returns to normal. In the hæmolytic types it is much more difficult to get improvement, however, and if the anaemia is in any way severe, transfusion of blood is undoubtedly the best method to adopt to cure this. This is well shown in the series of cases published by Dr. Cooke and myself (*Lancet*, 1927, 11, p. 960). In these a large quantity of blood, 500 c.cm. or over, was used, but more recently we have been trying small injections of whole blood, 10 c.cm. only, and in two cases this has seemed to supply the stimulus necessary to start the blood regenerating again. It must be borne in mind that sprue is one of the diseases in which auto-agglutination of the blood takes place, and special precautions have to be taken in transfusing to prevent bad effects appearing. It would seem that undue cooling of the blood is specially dangerous, and this must be guarded against. The grouping must also be carefully gone into.

Drugs may be employed, and of these arsenic comes first. It is best given by intramuscular injections, and the addition of iron is not prejudicial, but rather the reverse. Squire's arsenate of iron in doses of 7 minims every alternate day, or Fraise's preparation, can be employed. Iron is badly tolerated by the mouth in cases

of sprue, but some cases can take arsenic in the form of liquor arsenicalis (Fowler's solution) by the mouth, often with great benefit. The dose, small to begin with, should be gradually increased up to 7 or 8 minims three times daily, till signs of intoxication appear. After this a rest is given, this being followed up by another course, and so on. One of the chief signs of improvement, indicating that things are going well, is the gradual steady increase of the red cells. After the blood has returned to normal it should, however, be tested at intervals of two months or so, to make certain that the improvement is maintained.

Remarks.—From what has gone before it will be seen that sprue is a very important tropical disease, and an intestinal toxin, probably, best explains its symptomatology. Little has been said in the text about specific drugs. Yellow santonin had a vogue for a time, but personally I could never see any special results following its use. I have tried parathyroid and calcium lactate in a few cases not included in this series. The use of strawberries is remarkable in certain cases. It must be borne in mind, however, that some cases do not tolerate the berries, while in others they have no effect at all, and that it is only in a small group that occasionally wonderful results are met with. They should certainly always be given a trial when available. Lime would seem to be of value when the diarrhoea is present, and it may be given in the form of Batavia powder in drachm doses three times a day. This has been used in many of the cases analysed above. The so-called meat treatment has never given satisfactory results in my hands and is in every way inferior to the milk treatment. As regards going back to a tropical climate, we must consider each case on its own merits. It is better that such cases should not, but in certain instances necessity has compelled a return and no ill effects have arisen.

Warts and Their Treatment.

By A. C. RONBURGH, M.D., M.R.C.P.

(*The Practitioner*, August, 1928, p. 80.)

THE essential feature of all types of true wart is a localised hypertrophy of the prickle-cell layer of the epidermis leading to a great thickening of this layer. Normally, mitoses can be seen only in the deepest or basal layer, but in warts mitoses can be seen in the whole thickness of the prickle-cell layer, showing that the cells are going on multiplying owing to some abnormal stimulus. In addition to mitoses, various degenerative changes can be seen which will be referred to later on.

If the thickness of one layer of skin is greatly increased the added tissue has to go somewhere, and the usual result is that in addition to the formation of a projection on the surface the interpapillary processes are elongated and widened. A great increase in the prickle-cell layer, the so-called acanthosis, leads, usually, to some degree of hyperkeratosis—thickening of the horny layer, and usually also to some parakeratosis—imperfect formation of horn cells, the cells still containing nuclei and tending to stick together as visible scales or flakes. If by pressure on the surface of the skin you forcibly prevent the increase of tissue from causing a projection on the surface, as it has to go somewhere it projects inwards and depresses the corium. Varying degrees and combinations of these secondary features account for the different varieties of warts.

The typical *plane* or *juvenile* warts common on the hands and faces of children are the simplest type of wart, and the type from which the other forms can be regarded as being derived by accentuation of one or another character. These plane warts are small, smooth elevations two or three millimetres across and perhaps half a millimetre high, and are the colour of the normal skin. They often occur in great numbers on the hands and faces of children. When looked at with a lens the surface can sometimes be seen to be not truly uniform, but showing a slight degree of "raspberry" appearance. Structurally they consist of a moderate thickening of the prickle-cell and horny layers with a moderate and fairly regular lengthening of the papillae caused by the downgrowth of the interpapillary processes.

The common wart is a development of the type of the plane wart, and is often found on the hands of children who have plane warts on their faces. Here the inter-papillary pegs of the prickle-cell layer have become much more pronounced and often irregular, the papillæ being drawn out between them; and the individual papillæ are more distinguishable on the surface, each with its cap of horny layer. In the common wart there is a considerable degree of lengthening of the papillæ and a considerable degree of hyperkeratosis.

The plantar wart is similar to the common wart except that, owing to pressure (as it occurs on the sole of the foot or heel) the lengthened interpapillary processes are forced inwards so as to invaginate the corium, and they become surrounded by a thickened ring of epidermis. The opening of the pocket containing the wart is narrower than the bottom of it as a rule. Owing to pressure on the nerve endings below, these plantar warts are very painful, just as corns are. They are often mistaken for corns. They occur chiefly under the ball of the great toe or under the pad of the toe itself and on the heel.

The filiform wart is found on the neck and chin, on the scalp, where it is often digitate, and on the genitals, where it takes the form known as *condyloma acuminatum*, and is often misnamed venereal or gonorrhœal wart. It is derived from the type of the plane wart by an enormous stretching of the papillæ, due to the very active growth of the cells of the prickle-cell layer, the horny layer being very thin. Apparently the warmth and moisture of regions upon which condylomata acuminata flourish have something to do with their characteristic profuse vegetative growth. It is a complete misnomer to call them venereal or gonorrhœal warts, for, as Charles W. Cathcart of Edinburgh was one of the first to show, they have no necessary relation whatever with gonorrhœa or other venereal disease. When I was in part charge of the V. D. clinic at St. Bartholomew's Hospital in the year 1920 we had nineteen cases with warts on the genitals (twelve male and seven female). Gonococci were found only in seven out of the nineteen, which equals 36.8 per cent. K. Brandes reported thirty-eight patients with condyloma acuminatum, of whom twenty-six had verruca vulgaris as well. More than half had no gonorrhœa. In the patients who had gonorrhœa the warts followed two to five months later. This interval is similar to the incubation period of experimental inoculation with verruca vulgaris. The question therefore arises, Did they get inoculated with warts at the same time as with gonorrhœa? In the non-gonorrhœal cases verruca vulgaris sometimes preceded the condylomata.

There is some doubt whether the senile or so-called seborrhœic wart has or has not the same etiology as the types of wart I have already described. Kyrle classes it with the others, and I shall so regard it. This wart is a rather flat, brown elevation on the skin of the back, trunk or face of middle-aged or elderly individuals.

Hoffman has described two cases of what he considers to be *generalized verrucosis* of the scalp, and what are probably other cases of the same nature have been described by others.

With the possible exception of the senile or seborrhœic wart, all the above types of wart—plane common, filiform and condyloma acuminatum—are due to one and the same filter-passing virus. It is well known that warts are infectious and inoculable; and there is the popular belief that, if you make a wart bleed, wherever the blood goes the patient will get a fresh crop of warts. One often sees a line of warts on the face or hand of a child obviously following a scratch. Numerous investigators have worked at the etiology of warts.

TREATMENT.

Common Warts. Chemical Caustics: Nitric Acid.—This should be applied by the medical man and not left to the patient. It is a good plan to protect the surrounding skin with vaseline and then to apply a drop of the caustic to the whole surface of the wart. This is allowed to soak in and then another drop may be applied, according to the size of the wart. Be careful not to use too

much. In four to seven days cut away with a sharp scalpel all the yellow dead tissue, but stop short of causing bleeding; re-apply the acid as before. Proceed in this way until the wart has entirely gone. Trichloroacetic acid and acid nitrate of mercury may be used in the same sort of way. The advantage of nitric acid over CO₂ snow for warts on the hands is that no blister is formed, and no raw area is left, but, on the other hand, it may produce more scar.

CO₂ Snow.—The advantages of this are that one application may cure a wart and little scar is left, but the drawbacks are that the patient may have a blister for a few days and may knock it off and be left with a small raw area which, in the case, for example, of doctors and nurses, is a disadvantage. If the degree of freezing has been exactly right the wart will drop off in about two weeks without any visible blister being formed. On the other hand, if the freezing has been insufficient nothing will happen at all. If the wart has a hard horny surface soften it first with liquor potassæ, applied with a match, for ten minutes, and then take a stick of CO₂ snow, compressed as hard as possible, and shaped so as exactly to fit the wart and not overlap it at any point. Then apply the pencil of snow with firm pressure until a ring of frozen tissue appears all round the wart. If this ring has not been in contact with the snow its appearance indicates that the wart has been frozen right through, and is a better guide than timing the application. Usually this takes one to two minutes.

Burning off the warts with the galvano-cautery under novocaine is the quickest way to remove a crop of warts, and obviates the bleeding which is associated with curetting. I think this point is of some importance as reducing the risk of fresh inoculation. As much of the burnt tissue as possible should be scraped away, short of causing bleeding.

Another rapid method is by electrolysis or zinc ionization. The needle (if of steel, negative, and if of zinc, positive) is used to transfix the base of the wart in several directions so as thoroughly to thrombose the vessels. The wart is then cut off cleanly with a sharp scalpel. A current of two milliamperes is used, and novocaine is not essential, although its use allows one to use rather more current.

In cases with a large number of common warts—on the back of the hand, for example—a pastille dose of X-rays unfiltered, to the whole area, often causes the warts to disappear. If one dose is insufficient it may be repeated once in four or five weeks. Common warts at the edge of the finger-nails are sometimes very troublesome to get rid of. The best treatment is probably by radium or X-rays; of the latter I usually give two pastille doses, unfiltered, in one sitting, through a hole in a piece of lead foil, which is cut exactly to fit the wart. The lead foil should have some adhesive strapping on its deep surface to cut off the secondary rays given off by the lead under the influence of the X-rays.

Plaque Warts.—If few in number these may be touched by the patient daily with glacial acetic acid. They are usually too small and too numerous to make CO₂ snow practicable. They may be painted every day or two with salicylic acid 12 per cent. in collodion, the collodion film being washed and rubbed off before each new application. A patient with plane warts on the shaved area of the face should apply a hydrarg. perchlor. lotion, 1 in 2,000, after every shave for some months to prevent recurrence. The galvano-cautery at a very dull red heat may be used lightly without novocaine in some patients with plane warts, with good results. But there is little doubt that by far the most satisfactory treatment for a crop of plane warts is by X-rays; three-quarters to one pastille dose, unfiltered, is given to the most thickly infested areas, and very likely the less affected areas will then clear up without treatment, owing presumably to some antibody being formed as a result of the absorption of those warts actually exposed to the X-rays. This dose may be repeated, if necessary, in a month or five weeks.

Filiform Warts.—These are best treated by transfixion of the base by an electrolysis needle to thrombose the vessels, the wart being then simply cut off, as in the

case of common warts already described. Novocaine and cautery or zinc ionization can also be used.

Digitate Warts.—These are common on the scalp and can be treated in the same way as filiform warts or very successfully dealt with by applying about one drop of strong nitric acid to each. Do not use too much or at the patient's next visit you will be surprised to find a hole of unpleasant depth in the scalp. These warts have a great capacity for absorbing nitric acid. Glacial acetic acid is safer, but not so rapid.

Condylomata Acuminata.—These are best dealt with by cutting them off with a galvano-cautery under an anæsthetic, which may be local or general, according to the size and situation of the warts. The sites should be kept clean and dusted with, say, acid salicylic 1 part, talc powder 3 parts, until healed. Small condylomata acuminata can be quite successfully dealt with by rubbing with the solid silver nitrate stick, and they are in my opinion about the only kind of wart which can be treated successfully with silver nitrate.

Plantar Warts.—As I have already said, these are only common warts which, owing to the pressure against which they grow, have become invaginated into the sole of the foot. There are two successful methods of treatment, and in my experience only two. The quickest is to scrape out the wart ruthlessly with a Volkmann's spoon under a general or local anæsthetic. After some pretty vigorous work with the spoon you will find that the wart shells out nicely, leaving a smooth walled cavity whose size and depth will probably surprise you. The mouth of the cavity may be a good deal narrower than the deeper part, and the thick epidermis forming its walls must now be clipped off with curved scissors until it slopes gently away from the deepest part of the cavity. The wound is then mopped with silver nitrate solution 15 grs. to the ounce, or with tincture of iodine, and dressed with gauze soaked in tincture of iodine. After a couple of days the original dressing is removed and the wound dry dressed till healed. There is little or no pain after this operation, and although some patients prefer to rest the foot for a few days all do not do so. Occasionally as the hole heals up a small horny plug is found in the centre. This is quite superficial, and should be removed by paring once or twice just as though it were a corn. I have never seen a painful cicatrix follow this method of treatment.

The only other successful method of dealing with plantar warts that I know is by means of X-rays. These should be applied as follows. The wart is pared with a sharp scalpel as far as possible, short of pain and bleeding. This is mainly to get an idea of the real area of the wart which is usually much larger than appears from the surface. A hole is now cut in a piece of stout lead foil corresponding in size and shape with the estimated real size of the wart. The foil is backed with strapping and then secured firmly to the skin with more strapping so that the wart appears exactly in the hole cut for it. Two or three pastille doses of unfiltered X-rays are then given, at one sitting, to the wart, using a lead glass applicator whose opening must be smaller than the area of the lead foil, so that there is no chance of the healthy skin getting the heavy dose intended for the wart only. After the X-rays the patient should wear a thick piece of felt, adhesive on one side, with a hole cut in it, to relieve pressure on the wart, on the lines of the common corn plaster. Usually within three to four days all pain ceases and the patient forgets about the wart. In a month or six weeks it may be pared or scraped and will often be found to be entirely removable without any pain or bleeding. It often happens, however, that one dose of X-rays, even of three pastilles, is not enough and further doses must be given. This is no doubt due to the filtering off of the rays through the horny superficial layers of the wart.

The X-ray treatment of plantar warts is, certainly the method which gives least trouble to the patient, but its results are not so rapid or so certain as removal by scraping in the manner I have described. Radium, if available, can be used instead of X-rays.

"Seborrhæic" or "Senile" Warts.—These rough brown or black elevations are easily removed by freezing with CO₂ snow, or by painting with pure carbolic acid, once or twice, as may be required.

I shall now refer briefly to some other warty conditions which are not related to the true warts so far as we know.

The so-called *post-mortem wart* (*verruca necrogenica*) is due to direct implantation of the tubercle bacillus in the skin by accidental prick or injury. It consists of tubercles, with giant cells and tubercle bacilli, in the deeper layers of the skin with, sometimes, miliary abscesses. There is an infiltration of small round cells beneath the epidermis and some dilatation of blood vessels. There is also a secondary hypertrophy of the prickle-cell and horny layers leading to a warty appearance. The best treatment is excision or destruction by cautery, if small and acute. If chronic or large, X-rays, radium, Finsen light or selective caustics such as pyrogallol acid, locally, together with general carbon arc light baths.

The *keratoses* on the face and hands seen in elderly people, especially in those who have been exposed for many years to strong sunshine, and which form part of the picture known as "sailor's skin" or "senile skin," can be removed by the galvano-cautery, curetting or by CO₂ snow. If any of them show a tendency to rapid growth it is probably better to excise such completely, in case they should be developing into epitheliomata. The same applies to the warty growths which occur in chronic X-ray dermatitis and to the keratoses seen in men who have worked for many years with tar, or crude mineral oils, or who have taken arsenic over long periods, for example for psoriasis. Radium also may be used for the treatment of the above types of keratoses, even for those in chronic X-ray dermatitis.

Radium Implantation in Œsophageal Cancer.

By JOSEPH MUIR.

(*Laryngoscope*, 37: September, 1927, p. 660.)

CANCER of the œsophagus is generally regarded as the most hopelessly incurable of malignant lesions. None of the forms of treatment which have proved successful in combating cancer elsewhere in the body have heretofore been possible of application to the œsophagus. Radium has been less beneficial than surgery. Three prime drawbacks to this use of radium have always existed: first, the difficulty of placing it accurately; second, the practical impossibility of maintaining it in position long enough to be effectual, and third, the great danger of burning the tissues, which will induce sloughing and fistula into the mediastinum—invariably a fatal accident.

To obviate these difficulties the author has elaborated a technique of radium implantation through a specially designed œsophagoscope which can be readily carried out by anyone experienced in the use of this type of instrument. The field of operation is illuminated and an implantar passed through the tube, so that each radon seed may be placed in full view, and the entire lesion accurately mapped out and evenly implanted. The radioactive centre employed is a removable platinum radon seed, which offers the double advantage of being so screened that it will not induce necrosis, and the possibility of removal by means of an attached thread so that no foreign bodies are left in the tissue after the contained radium emanation has entirely decayed. The entire procedure is facilitated if done under the fluoroscope, though this is not absolutely essential.

The results in the small series of cases so far treated by this method have been highly gratifying, and although no permanent results can be reported before the lapse of five years, the author feels that the method merits a wide trial, even if it proves to do no more than prolong lives which otherwise will be very shortly terminated.

Reviews.

SELECTED PAPERS ON INJURIES AND DISEASES OF BONE.—By Sir William Ireland de C. Wheeler, M.D., F.R.C.S.I., F.A.C.S. (Hon.). London: Baillière, Tindall & Cox, 1928. Pp. xx plus 148, with 100 figures in the text. Price, 10s. 6d. net.

THIS book is a reprint of papers which have appeared in various journals. The first four sections are a synopsis of a series of lectures on fractures of the bones of the lower extremity which were given for the University of London at St. Bartholomew's Hospital and are an excellent epitome of the most modern methods. The results which can be obtained in cases of mal-union without open operation by refracture and powerful extension are well illustrated by the cases described, in two of which secondary displacement occurred owing to the limb having been actually over-elongated, leaving a gap between the two ends of the fractured bone though the alignment was perfect. To convert a shortening of $3\frac{1}{2}$ " of three months standing into a lengthening of $\frac{1}{2}$ " is testimony to the efficiency of the extension methods employed. The remaining papers deal with a variety of subjects, a modification of Albee's operation for fixation of the spine, with which the author has had considerable success, though he is in agreement with the general view that these operations are not indicated in children; a method of approaching the sacro-iliac joint without disturbing the posterior sacro-iliac ligament and two papers on bone grafting which contain many valuable observations and hints, to mention only the most important. All the papers in this little volume are of interest especially to post-graduate students and candidates for higher examinations.

W. L. H.

TREATMENT BY MANIPULATION.—By A. G. Timbrell Fisher, M.C., F.R.C.S. (Eng.). Second Edition. London: H. K. Lewis & Co., Ltd., 1928. Pp. xii plus 200, with 62 illustrations. Price, 9s. net.

THE first edition of this book under the title "Manipulative Surgery" was a welcome contribution to surgical literature and the appearance of a second edition so soon is evidence that at last the medical profession has begun to take an interest in this neglected branch of surgery. Bone setters thrive on cases which have been improperly treated in the first instance and if all students were instructed in the principles laid down in this book, the stream of cases which drift into the hands of quacks would soon diminish and dry up. A vast literature exists dealing with the pathology and treatment of joints stiffened or ankylosed as the result of disease or major injury, but very little attention has been paid to minor injuries and their results. Dismissed in the text-books with a brief paragraph, usually enjoining rest and fixation followed by passive movement, it is no wonder that the practitioner is at a loss what to do when this line of treatment leaves a stiff and painful joint liable to give way suddenly from muscular weakness. If he follows the traditional teaching he will probably immobilise the joint again, thus aggravating the symptoms and losing his patient who will eventually be cured by someone else breaking down the adhesions which were the cause of the trouble. The pathology of these cases is well set out in the opening chapters of the book and the detailed directions for manipulating each joint are preceded by an account of its anatomy, range of movements and the usual indications for this form of treatment. The value of the book to practitioners would be much enhanced by a short chapter on the treatment of sprains and contusions of joints when seen soon after the injury, the period when prevention of adhesions depends on the line adopted.

In the present edition the sections on osteopathy, tennis elbow, chronic arthritis and the lesions of the sacro-iliac joint have been enlarged and many case-

histories added, too many perhaps, for some of them contain too little detail to be of much instructional value. The book can be heartily recommended both to practitioners and students, but to those who have not had much experience in orthopaedic work in this country it is as well to add a word of warning, lest they be led into disaster. The stiff joints most often met with are due to septic processes in or around the joint or to chronic arthritis of gonorrhoeal or infective origin of long standing, which have led to profound intra- and extra-articular changes. The greatest caution is necessary in manipulating such joints, as acute inflammation is very likely to be lighted up by forced movement and the restoration of mobility must often be sacrificed in order to ensure a stable limb capable of weight-bearing. The section on "pros and cons of treatment of chronic arthritis by manipulation" on p. 35 should be read and pondered before tackling such cases. Considerable experience is necessary to decide in which cases the attempt to restore movement is likely to succeed.

W. L. H.

THE EYE.—By C. W. Rutherford, M.D., F.A.C.S. First Edition. New York and London: D. Appleton & Company, 1928. Pp. 404, with 12 original coloured plates and 305 black and white figures.

THE author states in his preface that the work is primarily intended for the general practitioner and student of medicine and that he has endeavoured to combine the advantages of a work of reference and of a teaching text. The arrangement of the book is such as to facilitate ready reference. The table of contents is full as also the index, and the subject matter covers practically the whole field of ophthalmology as dealt with in the larger text-books. In the reviewer's opinion the actual amount of information given under any one head is hardly what one would expect in a book of reference, but as a teaching text it undoubtedly fills a position in ophthalmic literature which is somewhat exceptional. The book should be of special value to the teacher who wishes to present his subject completely without unduly labouring certain sections to the neglect of others and who desires to give a survey of his subject in perspective, without taking his hearers into channels too remote from practical clinical considerations. In some respects it resembles a compilation of grind notes in ophthalmology for students and junior post-graduates rather than a text-book in the ordinary sense of the word. In style it is terse, controversial points are not laboured, and references to literature are few. The arrangement is convenient. Each sub-division of the eye is dealt with separately as regards its essential anatomy and its diseases, with the investigation and treatment of the latter including operative procedures. Chapters VII and VIII deal briefly with special methods of investigation, namely, ophthalmoscopy and perimetry and fall into their proper places in the text so that the reader is familiarised with these methods before their application is discussed. The teaching ought to prove acceptable to centres of ophthalmic education in India as the views expressed are in the main very similar to those taught in this country. Of the operative procedures described perhaps more than a fair share of space is devoted to those for ectropion and entropion. This being so, eye surgeons in the East will be disappointed to find no mention of Webster's operation. The plates are excellent, but as in most books on the eye some of the figures are indifferent, e.g., figure 188. The repeated mention of White's ointment may perhaps puzzle readers who are not acquainted with its composition. It is a much weaker preparation of Hydrarg. perchloride than the ointment popular in India. The author's approval of the discharge of cataract patients after 10 days would not meet the approval of many operators in India, but presumably it is safe practice in America. Transillumination of the globe in negro eyes is said to be difficult. One does not often see a reference to this fact in ordinary works on ophthalmology, but the same difficulty holds in our Indian clinics. Retained foreign bodies and their treatment, a subject which forms the major portion of the chapter on the vitreous, contains a vast amount

of valuable information in a small space. Embryological details are sparse and corneal microscopy is not dealt with. Indian readers might reasonably expect a more prominent mention of epitheliomata of the lids and limbus which are amongst the commonest new growths associated with the eye in this country. Prolapse of the iris is mentioned as an "occasional complication." This perhaps hardly does justice to one of the most serious bugbears of cataract work which occurs in most big operating centres in from 2 to 4% of the cases of cataract extraction. It is perhaps surprising to see mention of such a moot subject, and one so liable to be misunderstood without full explanations, as the non-surgical treatment of cataract. It is not clear why the author advises that yellow oxide should not be used at the same time as dionine. Muscles and refraction are dealt with simply and well. Chapter XIX, the last in the book, is exceptionally interesting and valuable in India just now as, under new legislation in connection with Workmen's Compensation, questions are continually cropping up with regard to degrees of eye injury for which there is no precedent to help the medical witness. It deals with "Industrial injuries, their compensation and simulation." The statements made therein carry the high authority of the recommendations of the Committee appointed by the Ophthalmological Section of the American Medical Association, the report of which was approved by the House of Delegates. The Committee's supplementary report published as recently as 1927, has been followed by the author. Those interested should read this chapter for themselves. It will be sufficient here to quote the following:—"Visual efficiency, industrially considered, is based on three co-ordinating functions or factors which are measurable, and on which percentages may be calculated. These are the acuity of central or macular vision, the field of vision, and the muscle or motor function for maintaining binocular single vision in the field of binocular fixation. Other defects may be present, but they are not measurable." The author proceeds to show how such defects may be expressed in percentages. The advantages of such a system are obvious. A description is given of various tests for malingering and simulation. The book is of convenient size, the print is good and it is well got up and produced. The author is to be congratulated on having brought out on new lines a work which will fill a place of its own in ophthalmic literature and for which many clinical teachers will be indebted to him.

NASAL NEUROLOGY, HEADACHES AND EYE DISORDERS.—By Greenfield Sluder, M.D., F.A.C.S. St. Louis, U. S. A.: The C. V. Mosby Company, 1927. Pp. 428, with 167 illustrations, including 2 coloured plates. Price, \$11.50.

DR. GREENFIELD SLUDER in his book "Nasal Neurology, Headaches and Eye Disorders" has set out to explain certain varieties of nasal disease which have as symptoms:—

- I. Headache,
- II. More or less eye disorders,
- III. Neurological phenomena that are evidently of nasal origin or are controllable by nasal treatment, to wit:—
 - (1) Closure of the frontal sinus without suppuration.
 - (2) Anterior ethmoidal neuralgia of the naso-ciliary nerve.
 - (3) The syndrome of nasal ganglion neurosis.
 - (4) The picture of hyperplastic post-ethmoidal-sphenoidal inflammation.
 - (5) Some neurological phenomena that are apparently not of nasal origin and are controllable by nasal treatment.
 - (6) Orbital phlegmon.

Pain in the head is gone into thoroughly and all the five points for distinguishing a pain due to the closure of the frontal or closure of the anterior ethmoidal cells or affection of the nasal nerve or affections of the nasal ganglion, are given with great care. Apparently some inflammatory condition of the sinuses, either known or unknown to the patient and often difficult of detection by the surgeon is or has been present. The syndrome

of nasal ganglion neuroses is gone into at great length, and Sluder would have us believe that such diverse conditions as writer's cramp, diarrhoea, glossodynia, photophobia, earache due to cancer of the larynx, corneal ulceration, abdominal pain and a host of other conditions may appear as symptoms due in some way to an affection of the nasal ganglion. No satisfactory explanation is, however, given for these various manifestations of disease in this neighbourhood. The ganglion is treated either by painting with 2% silver nitrate or by injections of phenol-alcohol. The injection method, however, has its dangers. The internal maxillary artery is in close relationship with the ganglion and a case is recorded where the carotid had to be ligated for bleeding from this source. Apparently trouble from hæmorrhage is negligible for Sluder says, "The number of bleedings in my experience has been few." Other dangers appear to arise from the alcohol reaching and paralysing the oculomotor, abducens and even the optic nerves, but as Sluder also tells us that "As is well known the anatomy varies in practically every nose" the method strikes one as being fraught with danger.

In dealing with hyperplastic sphenoiditis all the conditions which may result from the implication of the nerves of this neighbourhood are gone into, and the diagnosis, prognosis and the author's operative technique are fully given.

The book is to be regarded as one full of interest and full of ambitious speculation into much that is abstruse in the pathology of the many obscure phenomena described. It is worthy of serious attention and ought to be a stimulus to further research on the subject.

N. J. J.

DISEASES OF THE NOSE, THROAT AND EAR, FOR PRACTITIONERS AND STUDENTS.—Edited by A. Logan Turner, M.D., LL.D., F.R.C.S.E. Second Edition. Bristol: John Wright & Sons, Ltd., 1927. Pp. 440, with 234 illustrations and 12 plates. Price, 20s. net.

This compact text-book deserves the greatest praise. It is well arranged, well balanced, and for a plain statement of the case without embellishment with fads and fancies, is unbeaten. There is not one chapter in this book which is not crammed full of useful information, no undue stress is laid upon any section, and each chapter takes its own place in the picture. The book undoubtedly is the expression of the Edinburgh school of oto-rhino-laryngology, and contains evidence of its latest work. The chapter upon the ear is particularly good and for its size is beyond reproach. One would heartily recommend this book as being something more than an ordinary text-book on the subject.

N. J. J.

Annual Report.

ANNUAL REPORT AND STATISTICS OF THE GOVERNMENT GENERAL HOSPITAL, MADRAS, FOR THE YEAR 1927. BY LT.-COL. E. W. C. BRADFIELD, I.M.S., SUPERINTENDENT, GOVERNMENT GENERAL HOSPITAL, MADRAS. MADRAS: GOVERNMENT PRESS, 1928. PRICE, Rs. 9.

THE practice of incorporating short case histories in the annual reports of the Government General Hospital, Madras, makes these publications extremely interesting and the 1927 number is no exception.

Admission and Accommodation.—During the year 66,505 out-patients and 13,158 in-patients were treated at the Government General Hospital, or a daily average of 459.94 out-patients and 531.15 in-patients.

The results of treatment of in-patients are:—

	Non-Europeans.	Europeans.	Total.
Cured ..	5,614	1,136	6,750
Relieved ..	2,857	333	3,190
Otherwise discharged	1,732	163	1,895
Died ..	769	92	861 (6.54 per cent).

The number of Indian in-patients treated during the past ten years shows a steady increase and the slight decrease of Europeans is accounted for by the accommodation now available in other city hospitals.

Professional Work.—The following shows the total operative work done between 1st January and 31st December 1927:—

Number of patients remaining on 1st January 1927.	Number of operations during the year.			Result of operations.				Number of patients remaining.
	Primary.	Secondary.	Total.	Cured.	Relieved.	Otherwise.	Died.	
139	7,169	151	7,320	6,455	444	58	286, i.e., 3.91 per cent.	65

It is interesting that there has been a gain of nearly 6 days in the treatment of surgical cases, although the number of operations performed in recent years has been more numerous and cases especially in abdominal and gastric surgery, have often required prolonged post-operative treatment; while the time required for the complete treatment of a medical patient has remained much the same as in 1918. Septic complications are the most frequent cause of prolonged stay in hospital and their elimination from the operative results is due partly to better team work but largely to a cleaner, more airy hospital and improved nursing.

A fractured limb often demands prolonged in-patient treatment and is a heavy charge on a hospital administration. A very moderate estimate suggests that motor accidents are costing the hospital from Rs. 15,000 to Rs. 20,000 a year.

Epidemics.—Fourteen cases of cholera among non-Europeans and five cases among Europeans were treated during the year, nine of whom died in the hospital.

Training of Medical Students.—Two hundred and fifty-three students were given clinical instruction in 1927 as compared with 232 in 1926.

During the year the clinical teaching of students has been entirely reorganized and remodelled on the lines obtaining in British medical schools. During their three years' clinical training students now hold definite appointments as Clerks or Dressers, at first, in the wards, where for twelve months they learn the rudiments of Medicine and Surgery and later in the Out-patient and Special departments. Final year students may follow any of the Medical staff on their daily ward visits and must attend the daily clinical lecture which is given by one of the Physicians or Surgeons.

To meet these requirements, the Out-patient Department has been re-organized. All patients are sorted by a junior member of the staff and are seen by the Assistants of the Hospital Physicians and Surgeons in the Medical and Surgical Clinic. Each Assistant attends from 7-30 to 9-30 on the admission day of his Chief for the purpose and is assisted by the students attached for duty. This institution of out-patient clinics has worked extremely well and has enabled the regular out-patient staff to pay more concentrated attention to all emergent cases attending the hospital.

The newly constituted Ear, Nose and Throat Department under Dr. Cherian, and the Special (Venereal) Department under Dr. Ramakrishnan are both well

organized and doing very valuable work. Orthopædics are now treated by the Surgical Registrar on two days a week and though the scope of this department is limited in India, it has worked very successfully. All fractures attending the Out-patient Department are referred to the Surgeon-in-charge for continuous treatment.

These new departments have entailed redistribution of the very limited accommodation available, and so far as was possible, the building has been well adapted to the change under the direction of the Resident Medical Officer, Major D'Souza.

Buildings.—The acceptance of the scheme for rebuilding and remodelling the General Hospital on its existing site has necessitated the erection of five temporary sheds to replace those which occupied the space required for the proposed new buildings.

The Hospital buildings dating from 1772 have suffered severely from the financial stringency of recent years and annual repairs have always been cut down to a minimum. Original estimates for these repairs from 1924 to 1928 amounted to Rs. 49,400 but only Rs. 33,600 were actually spent. Several items have been postponed because of the rebuilding scheme. Among them the re-flooring of the wards desired to replace the present asphalt complained of as unsuitable so long ago as 1869.

During the year under review a great many improvements have been effected notably in the first-class paying wards, and in the latrine system, especially the provision of modern bed-pan flushes only three of which formerly existed for the whole hospital. The Indian Nurses' quarters had to be demolished and new quarters were built for them on the second floor. An expenditure has been sanctioned for improvements to the nurses' bath-rooms and kitchens which were in a disgraceful condition and this work will be completed during the financial year.

Diets.—The average cost of diets has not exceeded the permissible limit laid down in the Government Order except in the months of October and November 1927 under "ordinary European." These are under the daily check of the Assistant Accountant of the hospital and under the concurrent monthly audit of the Accountant-General, Madras.

Professional and Scientific Reports of Physicians and Surgeons.

FIRST PHYSICIAN'S WARD.

Plasmochin in the Treatment of Malaria.—During the course of the year twelve cases of malaria were treated with plasmochin, careful observation being made with regard to (1) disappearance of the fever, (2) disappearance of the parasite, (3) changes in the motility of the parasite in case of B.T., (4) toxicity of the drug and (5) relative value when compared with quinine.

Mode of administration:—

- (1) $1\frac{1}{3}$ grain three times a day for five days.
- (2) Three days' rest without any plasmochin.
- (3) Another three days' course with $1\frac{1}{3}$ grain three times a day

The following conclusions were drawn:—

- (1) In cases of B.T. and quartan, the parasite disappears by the end of the fourth or fifth day after the administration of plasmochin.

(2) Diminished motility of growing trophozoites of *Plasmodium vivax* could be seen by the second day.

(3) No gametocytes could be seen after the third day.

(4) In malignant tertian infection plasmochin had no effect at all, the temperature remained and the parasite persisted.

(5) When a dosage of quinine sulphate fifteen grains was added on with the plasmochin, temperature came down and parasites disappeared.

(6) With control cases treated by quinine, in the same number of days the parasites disappeared at least forty-eight hours before the disappearance of parasites in the case of plasmochin.

(7) Toxicity. Only mild toxic symptoms were present. Headache, giddiness and abdominal pain were present in three of the patients. Only one patient showed slight cyanosis but no change could be detected in the urine. Deafness and ringing of the ears were present in one case, but this was temporary and lasted for only two days.

THIRD PHYSICIAN'S WARD.

Report of post-mortem work done in the General Hospital, by Capt. P. N. Basu, I.M.S., Professor of Pathology, Medical College, Madras, and Third Physician, General Hospital, Madras, during the year 1927.

Two hundred and five post-mortem examinations were held in the year ending December 1927. This is the largest number on record in this hospital. Of these nearly 40 were medico-legal autopsies for cases of accidents, mostly street accidents.

There were 7 cases of well-defined post-operative broncho-pneumonia with no case of collapse and only one case of infarction.

A case of Hodgkin's disease is worthy of note as it terminated by military tuberculosis.

There was one case of post-operative acute dilatation of the stomach with a large mesentery causing a kink in the duodenum.

Another case of interest was that of an old man with multiple soft vascular tumours scattered all over the trunk and limbs in which the microscopical appearances suggested mycosis fungoides. Autopsy showed secondary deposits in the internal organs particularly in the liver and spleen.

Among medico-legal cases of interest may be mentioned one case in which a small coil of the ileum was found in a hernial sac entirely cut off from the rest of the bowel. The edges of the loop were entirely clean cut as if made with the knife. It would appear that the individual had an inguinal hernia and that the loop of bowel was cut off at the iliac crest by the mudguard of a car striking against him in the region of the inguinal canal.

FOURTH PHYSICIAN'S WARD.

Myelitis due to Gonococci.—Admitted with a history of paresis. A young man, about 24 years old, belonging to a survey party was admitted into hospital on 28th September 1927 with paresis of both legs and aphonia. The paresis is said to have set in suddenly, the patient woke up one morning to find that he could not use his legs. Five days later his voice began to get hoarse and his right upper extremity to weaken. On examination, he was found to have flaccid paralysis of the muscles affected and to be suffering from gonorrhoea, and he was put on a course of polyvalent gonococcal vaccine followed by intravenous injections of sodium iodide. The patient's aphasia cleared up very rapidly and he was discharged cured of his paralysis on 31st December 1927.

FIRST SURGEON'S WARD.

Gastric and duodenal Ulcers.—As recorded in recent annual reports, ulcers of the stomach and duodenum have become of special interest to surgeons of the General Hospital, although before 1921 they were rarely diagnosed in Madras. Pugh first drew attention to their prevalence in Travancore and South India and to the good results obtained from operative treatment and at the recent Calcutta Congress of the Far Eastern Association of Tropical Medicine

the results in 1396 patients who had been treated by the Surgical staff during the past 6 years were reviewed. Such a marked increase (from 9 gastric operations in 1920 to 246 in 1927) is difficult to explain except by a previous failure to recognize the rapidity with which these patients will recover from symptoms when given complete rest and a low diet. Dyspepsia has always been a common complaint amongst out-patients, although present experience does not agree with Furnell (Annual Report 1877) who suggested that "the principal causes were the use of indigestible food, excessive eating and drunkenness." It is possible that a careful study of dyspeptic cases especially their chronic and relapsing characteristics would reveal a greater prevalence than is now acknowledged in other parts of India.

When dealing with so many patients, methods of examination naturally follow a definite routine and although not equal to the scientific efforts of other and better equipped clinics, it may be of interest to record them here. The chronic and relapsing nature of these ulcers is their most constant characteristic and a history of recurring attacks of pain, which come on at definite regular intervals after every meal is very suggestive. The history is carefully taken by a student who makes enquiry about the earlier symptoms and especially for evidence of relapses. Careful record is kept by the nurse of the diet taken, of the time after food when the patient complains of distress and whether the pain is relieved by taking a drink or more food. So-called hunger pain is not common in the later stages of a duodenal ulcer but when present is very suggestive. Examination always reveals marked tenderness or rigidity in the right hypochondriac region and visible peristalsis of the stomach can often be seen after the patient has drunk a glass of cold water. Superficial hyperaesthesia may be elicited in a definite area internal to the tip of the 9th costal cartilage and is possibly related to the activity of the ulceration. The stools and the urine are carefully examined and the finding of ova in the faeces or bacilli in the urine may reveal the cause of a chronic dyspepsia. In doubtful cases, X-ray photographs of the stomach and intestines are taken after a bismuth meal and of the gall-bladder after the administration of Kerosol. Attempts to take fractional test meals with Indian patients have generally emptied wards. At one time the conventional Ewald test meal was given to all gastric patients but the help obtained in diagnosis was not very striking and results suggested that in Indian patients free hydrochloric acid, estimated half an hour after food, was not markedly increased either in duodenal ulcer or gastric ulcers. Most Indian patients have infected teeth, and all are referred soon after admission to the Dental Surgeon for treatment. The majority refuse dental extraction but sealing and thorough cleansing in every case are insisted on. The vague indigestion which is so frequently an early symptom of a tuberculous infection, is probably responsible for many mistakes in a province like Madras where tuberculosis is so common. It is dangerous to make a diagnosis of appendicular dyspepsia unless a very careful examination of the patient's lungs has been made.

The decision as to treatment is governed by the economical position of the patient. Few Indians either have the patience or can afford the time to carry out the prolonged medical treatment, which is necessary to ensure a cure in any but early cases.

Compression Fractures of the Spine.—Seven cases of "Traumatic Spondylitis" which were admitted during the past year and whose notes have been collected by Mr. R. Mahadevan suggest that compression fractures of the vertebrae are not so rare as is commonly supposed. Obscure back injuries to coolies engaged in lifting heavy bales or to toddy-drawers who fall from a tree directly on the buttocks are often of this nature.

SECOND SURGEON'S WARDS.

[A case of pancreatic lithiasis was admitted during 1927 and on account of the rarity and interest of such a condition we quote verbatim from the report of the

Second Surgeon Major K. G. Pandalai, I.M.S.—Editor,
I.M.G.]

(a) A Hindu, male, aged 26, was admitted on 5th August 1927 for pain in the epigastrium of six years' duration. He was of spare build and stated that his father had suffered from a similar complaint but lived to late middle age. In the beginning the pain in the epigastrium used to appear during the rainy season, i.e., June and July; but latterly it has appeared soon after meals throughout the year. He has also a sense of distension of the upper abdomen after meals with acid eructations. There has been no vomiting. The attacks come once or twice a month and last about a week at a time. They subside under careful dieting. In the beginning liquid diet used to relieve him but latterly this does not relieve. There is slight anemia. The from occasional attacks of diarrhoea, the motions containing undigested rice. There is slight anemia. The tongue is coated, teeth dirty, pyorrhoea alveolaris present. He has steadily lost flesh and at present weighs only 100 lb. The urine is normal. The motions under the microscope contain undigested vegetable matter, but no ova are present. There is generalised tenderness all over the abdomen, but it is not severe.

On account of the prevalence of duodenal ulcer in the district from which he hailed, a clinical diagnosis of duodenal ulcer was confidently made. A pre-operative skiagram was not taken. In Madras it is customary to operate for gastric and duodenal ulcer on a clinical diagnosis alone and a laparotomy was decided upon, although the absence of vomiting and the occasional incidence of diarrhoea did not fit in with the clinical picture of the disease usually seen in these parts. On 10th August 1927 the abdomen was opened, but no ulcer was demonstrable in the stomach or duodenum. In the course of a routine examination of the viscera, the pancreas was noticed to be abnormal and head, body and tail of the organ were indurated and gave a crepitant feel to the examining fingers as if it contained a number of stones. In the centre of the body of the organ was a rounded cystic swelling and this was opened into through an incision in the gastro-hepatic omentum. The knife could be felt to pass through a shell which appeared to be the calcified wall of a cyst. It then entered a cavity, $\frac{3}{4}$ inch in diameter, with a smooth lining and clear liquid contents—obviously, a cyst in the pancreas. A finger introduced into the cavity could be passed into a number of communicating channels leading away from the central cyst, proving that it was a retention cyst communicating with other dilated pancreatic ducts. Numerous calcified masses of various sizes could be felt everywhere but particularly in the head. As the whole organ appeared to be affected and the patient's condition would not permit a lengthy operative procedure, it was decided to drain the cyst and a drainage tube was fixed to the edges of the opening and brought out through the lesser omentum, the remainder of the incision being closed. For three days, drainage of clear fluid continued; analysis of this fluid did not show any pancreatic ferments. He gradually sank and died on the fourth day, on 14th August 1927. Just before death a skiagram was taken and disclosed the fact that stones were scattered throughout the organ.

A post-mortem examination was carried out and the following were the relevant findings:—

The abdominal wound is infected, and contains a few drachms of pus. Areas of fat necrosis are present in the great and lesser omenta. There are no signs of peritonitis. The pancreas is nodular, firmer than normal and, scattered in the gland substance, are a number of irregular, hard, grating lumps. On section the number of various sizes are found everywhere. The termination of the common bile duct is partially blocked by a mass of stones in the head of the pancreas. The opening of the pancreatic duct is obstructed by a calculus $\frac{3}{4}$ inch in diameter. The gall-bladder is normal. The right pleural cavity is obliterated by adhesions. The right lung weighs 15 oz., shows marked thickening of pleura, lobes adherent to one another, is not crepitant except at the apex, and is congested.

bronchi are markedly congested, the left lung weighs 10 oz., normal. Liver and spleen smaller than normal, flabby. Cause of death right-sided pneumonia in a subject of chronic pancreatitis with calculi and cyst formation. A section of the pancreas examined microscopically shows atrophy of glandular elements; but islets of Langerhans are present. There is marked increase of the interstitial tissue. The appearances are those of chronic interstitial pancreatitis.

(b) The following meagre notes of a case admitted on 21st March 1913 are of interest in this connection. An ill-nourished male, Hindu, age 36, weight 68 lb., was admitted for diabetic gangrene of the right foot. The urine contained sugar but a quantitative estimation was not done. Under general chloroform anaesthesia amputation was performed a hand's breadth below the right knee-joint. Death took place on 27th March 1913 and a post-mortem examination disclosed an atrophied pancreas which had been converted from head to tail into a long conical bag containing numerous stones. Death was due to pneumonia. A section of the pancreas examined microscopically shows complete atrophy of glandular tissue, only a few degenerate acini being visible; there is great increase of fibrous tissue; the arteries show atheromatous changes. Islets of Langerhans are absent.

(c) Another specimen preserved in the museum is the pancreas of a male, aged 29, admitted on 27th August 1912 for cerebral malaria who died the next day. A detailed clinical history is not available but a post-mortem examination revealed the usual appearances of cerebral malaria; also a stone half the size of an almond in the pancreatic duct. A section examined microscopically shows atrophy of glandular elements and marked increase of interstitial tissue. The ducts are dilated and a few islets of Langerhans are seen. The appearances are those of chronic interstitial pancreatitis. A skiagram of the specimen shows a solitary stone in the centre of the pancreas.

(d) A fourth specimen of a pancreas showing numerous stones in dilated ducts is in the museum but no clinical notes are available. Microscopically this specimen also shows the appearances of chronic interstitial pancreatitis but islets of Langerhans are visible. A radiogram of the specimen shows multiple calculi.

Comments.—A noteworthy feature of the above cases is the preponderance of males (3 out of 4) and the age incidence which is between 25 and 35. An analysis of the stones shows that they consist of organic and carbonates of calcium with a trace of organic matter. The history is of many years' duration, emaciation is marked, dyspepsia and diarrhoea are present and occasionally generalized abdominal discomfort and even tenderness; vomiting is absent. In one case diabetes was present and in this a section of the pancreas showed almost complete disappearance of the glandular acini and islets of Langerhans and replacement by fibrous tissue. Diagnosis by ordinary clinical examination alone is not easy. X-rays will clinch the diagnosis. Treatment by diet and medicines has been generally employed for long periods before the patient comes to the surgeon and on the analogy of salivary calculi which they resemble closely in composition, drugs could not be expected to dissolve stones once formed. Operation may have to be performed for the pain and should consist of the removal of as many stones as can safely be removed especially from the termination of the pancreatic duct, as here a large stone may obstruct the common bile duct. A general anæsthetic has necessarily to be administered but seems dangerous as in two of the above cases death was directly or indirectly due to pneumonia, chloroform being the drug used in both cases.

Major Pandalai also records an interesting case of thoracic aneurysm in which an attempt at radical treatment by Colt's wire snare method was made.

A Hindu, male, aged 40, was admitted into the Madras General Hospital on 11th February 1927. Brown complexion, medium height, spare build, no anemia, skin rough and scaly, eyebrows and lobes of the ear thickened, finger tips and toes clubbed, presents

a pulsating swelling 2 inches in diameter in the region of the right sternoclavicular articulation. The pulsation is expansile. The skin over the swelling is glossy, a thrill is present and a loud bruit is audible; the right radial and temporal pulses are delayed and smaller than the left. The patient states that the swelling appeared 3 months ago with pain in the right side of neck, right shoulder and upper arm. Increase in size has been steady. Lately pain has been noticed in the right eyebrow. He has been unable to stand bright lights which produce lachrymation. He also feels a throbbing pain in the swelling. He and others have noticed a change in the tone of his voice lately. He is unable to abduct his right arm to more than half a right angle, and on account of the pain in the right shoulder, he has lately been sleeping on the left side. A history of syphilis was available and a strongly positive Wassermann reaction is present. X-rays showed absorption of the inner end of the right clavicle and right border of the manubrium sterni. Heart, first sound prolonged at the apex. Arteries are normal. There is slight drooping of the right cheek. Right pupil contracted and does not react to light: pulse 112, resp. 26, urine contains phosphates, otherwise normal. Wt. 80½ lb. Blood pressure, systolic 120 diastolic 80.

A diagnosis of aneurysm of the innominate artery involving its bifurcation was made and anti-syphilitic treatment with rest in bed was ordered. A dose of 0.2 grm. of Neosalvarsan intravenously produced such a severe reaction with cardiac distress that further intravenous medication was abandoned. He was thenceforward placed on Hg. and iodides t.d.s. by mouth. This he tolerated and continued until death. A fortnight's stay in bed with the above treatment did not produce any apparent improvement in the symptoms or reduction in the size of the swelling, and it was decided to try ligation of the third part of the axillary artery. This was carried out on 24th February 1927 and was followed by marked relief of the pain in the shoulder and upper arm. The right radial pulse disappeared entirely after operation. The aneurysm appeared to become firmer to the feel and its pulsations were appreciably reduced. However this improvement was maintained only for about ten days when the aneurysm began to enlarge and pulsate as vigorously as before. It was therefore decided to introduce into it Colt's wire wisp which was done under light chloroform anaesthesia on 16th March 1927. At the most prominent part of the anterior surface of the aneurysm a tiny nick in the skin about 1/6 inch in length was made and in penetrating the wall of the aneurysm with the instrument one encountered more resistance than one had anticipated as there was a thick stratum of tough fibrous covering to go through before the point was felt to be in a free cavity. Colt's No. 2 wire wisp was introduced. One expected on entering the aneurysmal sac to see a forceful jet of blood escape; but this did not happen, probably owing to the blocking of the lumen of the instrument by shreds of clot. Only a few drops of blood escaped; the introduction of the wire was an easy process and on removing the trocar the edges of the small puncture fell together and there was hardly any hæmorrhage. The small incision in the skin was closed by a stitch and sealed with collodion. Following the little operation marked relief of symptoms was noted by the patient who was now able to abduct his arm up to the horizontal. The pulsations of the aneurysm became weaker and it felt firmer than before. Improvement was maintained for a period of about 3 months when the aneurysm began steadily to enlarge again. About a month previous to death a small prominence of the diameter of an inch and rising above the level of the surrounding wall of the aneurysm was noticeable at the site of the puncture. As it grew steadily it became clear that the aneurysm was going to give way in this situation. About 4 days before death the shiny and atrophic skin at the summit of this projection gave way with the escape of a small quantity of blood. This was protected by a thick gauze pad bandaged on, but some oozing of blood occurred constantly from this spot until a couple of

minutes before his death when the base of the ulcer in the skin gave way *en bloc* allowing the escape of a large firm clot about 3 inches in diameter followed by a profuse gush of blood which ended in death within a few minutes on 31st October 1927.

Post-mortem.—There was a large saccular aneurysm 5 inches in diameter springing from the antero-lateral wall of the innominate artery 1½ inch from its origin and compressing the right common carotid and right subclavian arteries. It was lined by a thick and shaggy layer of laminated reddish-brown clot in the centre of which lay the wire wisp which had been introduced about 8 months previously. The free ends which in previous skiagrams had been noticed to be spread out umbrella fashion were now glued together by clot and had become comparatively straightened out and could not in their present condition have presented any great extent of surface for producing coagulation. It was also noticed that a number of the ends of the expanded wire wisp had been broken off and were lying free in the cavity of the aneurysm intermingled with the layers of the clot. These broken ends were not visible to the naked eye and became apparent only in a skiagram of the specimen removed after death. The wisp used was not a new one and had been stored on the instrument shelf for several months in a hot climate and had therefore become brittle and readily broken off when played upon by the currents of blood entering the sac. It is remarkable that none of these had been washed into the aorta, an accident which might possibly happen in other cases, unless very fresh and elastic material is always used. The arch of the aorta was thin and presented generalised syphilitic aortitis.

Comment.—There is no doubt that the wire wisp produced marked relief of pain temporarily but the point of entry of the instrument remained a weak spot in the wall of the aneurysm. Perhaps a second operation for introducing another wisp might have afforded further relief from pain but in the light of what happened after the first operation it is doubtful whether life could have been prolonged. The severe reaction following intravenous arsenical medication and the futility of mercury and iodides given orally for 8 months in the cure of syphilitic aortitis are points worthy of note. Post-mortem examination showed that the wire was lying in a free cavity, and it is interesting therefore to know that the aneurysmal cavity may be entered by the trocar and yet no gush of blood may occur to indicate the fact. Also blood clot may become so sticky as to glue together the wires of a No. 2 wisp and make it resemble a straight rod rather than an umbrella. Fresh material should always be used, otherwise the tips of the individual wires may break off and possibly become lodged in the aorta, heart or elsewhere."

THIRD SURGEON'S WARD.

(*Vesical Calculus eleven ounces.*) A Hindu, male, aged 40, admitted on 5th February 1927 for difficulty in passing urine, dribbling in drops, and frequency of micturition. He had also difficulty in passing motions, and complained of pain at the root of the penis; rectal examination revealed a hard mass in the region of the prostate, whose upper border could not be reached by the finger in the rectum. Lumen of the rectum much obliterated. Blood urea 90 mgms. per 100 c.c. Urea concentration, first hour 0.89, second hour 1.1.

Suprapubic cystotomy was done on 8th February 1927 and a large stone weighing 11 ounces was removed from the bladder. The bladder was practically filled up with this calculus which gave considerable difficulty in its removal as the bladder wall, which was much hypertrophied, was tightly gripping the stone. The bladder was washed out and a rubber drain put in and continuous suction drainage established. Patient progressed well for first few days but subsequently on account of severe pyococcal infection of the bladder and septic moribund on 4th March 1927 at the insistence of the relatives.

Essential Hæmaturia.—A young man, aged 20, was admitted on 7th August 1927 passing large quantities of blood in the urine and wide difficulty of micturition and severe pain referred to the tip of the penis. He gave a history of passing small quantities of blood occasionally for the previous two years. At the time of admission he had not passed urine for 24 hours and was complaining of severe hypo-gastric pains.

A rubber catheter was passed in easily but only a small quantity of blood-stained urine could be drawn due to blocking of the eye of the catheter by clots. The bladder was repeatedly washed out but the fluid never returned clear. As the patient continued to pass larger and larger quantities of blood, cystoscopy was done but no clear vision of the interior of the bladder could be obtained, as the clots therein could not be fully dislodged for a clear view. Suprapubic cystotomy done. Clots removed. No growth or calculus seen but rather a prominent inter-trochanteric bar. The bleeding appeared to be from the mucous membrane in general, which was purplish in colour; wound closed, with provision for bladder draining. Patient was subsequently put on hexamine grs. 10 thrice a day. Patient had no further hæmaturia, but intensive putrefactive cystitis with sloughing of parts of the mucous membrane resulted (ex-foliative). Repeated washings with H2O2 and with silver nitrate solution half a grain to one ounce gradually restored the bladder to a healthy condition. Suprapubic opening closed and the patient discharged cured on 13th September 1927.

Foreign Body in Stomach. (Coin with a Coin catcher.)—A child, aged 2 years, swallowed a one anna coin in a mofussil station and an attempt was made there by a local doctor to take it out with a coin catcher. The coin catcher broke inside and both the coin and the broken piece of the instrument had slipped into the stomach.

Patient was admitted on 1st June 1928 and the skiagram revealed the coin and the piece of the instrument. An open operation was done and the foreign bodies were removed. Patient was discharged cured on 12th June 1927.

Ovarian Cyst, 44 pints.—A Hindu, female, aged 50, was admitted on 9th March 1927 for an enormously distended abdomen, duration five years. Fluid thrill elicited. Dilated veins all over, swelling more marked on the right side, abdomen opened and a large multilocular ovarian cyst with a thin practically colourless fluid (44 pints) was removed. A small incision was made below the navel which had to be extended upwards later on. The extensive cyst wall was adherent to the parietal peritoneum, omentum and to several parts of the large bowel. Freeing of the collapsed cyst wall after tapping gave considerable difficulty. Adhesions had to be clamped and ligatured in several places. The cyst grew evidently from the ovary. The left ovary was functioning as it presented a recent ruptured Graffian follicle on it. The uterus was long, elongated, flabby, six times its normal size and had to be amputated supravaginally, before liberating the tumour. The right ureter was considerably elongated and adherent and had to be carefully safeguarded. The left ureter was not identified. The pelvic peritoneum was peeled off over a large area and eventually a raw cavity was left behind which could not be covered over. Intravenous saline two pints had to be given on the table and about 3 pints of saline were put into the general peritoneal cavity and the abdomen closed.

Patient made an uninterrupted recovery and was discharged cured on 4th April 1927.

OUT-PATIENT DEPARTMENT.

Anti-rabic treatment done in the General Hospital, during 1927:—

1. Total number of cases who attended for anti-rabic treatment ..	518
2. Number who completed 14 days' course ..	445
3. Number who did not complete the course ..	73
4. Number that developed hydrophobia ..	2
i.e., (i) after full course ..	1
(ii) incomplete course ..	1
(iii) who were not treated ..	Not known.

5. Number that died and cause of death:—Two of them died from hydrophobia.
6. Condition of patients on admission who died of hydrophobia and any other information regarding the Anti-rabic section. } Both patients died in this Hospital.

X-RAY DEPARTMENT.

Barium Meals.—During the year 421 patients were examined with the Umbrose shadow meal and the results obtained were very satisfactory, the conditions seen being verified at operation, in a large number of cases.

It was found necessary to increase the number of examinations in many of the patients especially the "gastries," in order to keep in close touch with the emptying stomach, radiographs being taken every 20 minutes or half an hour in some cases. It is hoped to have the screen room in use at an early date when it will not be necessary to take so many radiographs.

Dental Radiography.—1,133 radiographs were taken against 981 in the previous year. The value of this class of radiograph is being increasingly recognized, not only to assist the dentist in extractions where the tooth fangs may be malformed but cases of neuritis and other ailments have been traced to root abscesses and have been relieved after dental treatment.

Thoracic Examination.—1,694 radiographs were carried out during the year against 1,333 the previous year, most of the patients being from Dr. Kesava Pai, M.D., Superintendent, Government Tuberculosis Hospital and Institute, Madras. The erect posture is being demanded in all cases to show readily any fluid in the pleural cavity.

An interesting case of subclavian aneurysm which Major K. G. Pandalai, I.M.S., treated with insertion of wire was demonstrated. The patient died some time later and the post-mortem specimen was subsequently radiographed, these, with those taken during the patient's life, being published in Europe and America.

Examination of Skull.—Patients continued to be sent through Lt.-Col. R. E. Wright, I.M.S., Superintendent, Government Ophthalmic Hospital, Madras. 605 cases were radiographed in all against 462 the previous year. These included fractures, pituitary tumours and hydrocephalus, etc.

Examination in Pregnancy.—40 patients were examined during the year sent mainly from the Government Hospital for Women and Children, Madras. At the request of Dr. A. Lakshmanasawmy Mudaliar, B.A., M.D., a number of foetal monstrosities have been radiographed for publication in a monograph by that Medical Officer.

Sodium Iodide to outline the ureter and pelvis of the kidneys has been used by Major K. G. Pandalai, I.M.S., and several good radiographs have been obtained.

Kerasol has been used by many of the Physicians and Surgeons of General Hospital, the shadow of the gall-bladder being visible in a number of cases 12 to 17 hours after ingestion.

Diathermy and High Frequency.—9,340 sittings were given during 1927, this being an increase of 4,188 over the figures of 1926. Several cases of prostatitis and enlarged prostate were given diathermy and the patients obtained much relief with this treatment.

A number of patients suffering from bronchopneumonia and asthma were sent by the Superintendent, Government Victoria Goshia Hospital, for diathermy and all these showed decided improvement. These patients were also given Quartz Light (ultra-violet rays) exposure. Their temperature came down and the lungs cleared soon and in cases of asthma the acuteness of the attacks abated.

A case of high blood pressure with nervous disorder such as staggering gait, etc., improved marvellously

after a fortnight's treatment with high frequency current. He had suffered much for several months. A large number of cases of acne, blackheads of the face and eczema did very well under high frequency. Several cases of alopecia and dandruff were also treated in this department, most of whom did remarkably well, though in a few the treatment effected no change. A patient who had a circular bald patch about 3 inches in diameter came for this treatment. After two series of treatments the whole patch was covered with a thick growth of hair.

Several warts were removed successfully with high frequency current, leaving no scar or mark of any kind behind. This was particularly useful when the warts were on the face and more so when the patients concerned were ladies.

The cases for which diathermy and high frequency were mainly used are syecosis, pyorrhœa alveolaris, arthritis and synovitis of joints, lumbago, fractures of various kinds of different parts of the body, injuries of joints with or without ankylosis, neuralgia, and neuritis of the different parts of the body, myalgia, tennis elbow, writer's cramp, sinusitis (maxillary, ethmoidal, frontal), etc., and excellent results were obtained in a large number of them.

There were 21 diathermic operations performed during this year, for carcinoma of tongue, jaw and breast and for one case of chronic ulcer of penis.

Bergonie Chair.—This was successfully used for obesity in a young woman aged 17, weighing 14 stones 7 lb. After 4 months' treatment, off and on, her weight came down to 11 stones 2 lb.

Orthopaedic exercises were systematically given in cases of fibrous ankylosis injury to joints, particularly the ones with ankylosis and hemiplegia, with good results.

Ultra-violet Rays.—The Quartz Light and Tungsten Arc Lamps, which produce ultra-violet rays, were used for patients suffering from the following diseases:—

1. Eczema	..	..	128 cases.
2. Lupus	..	..	24 "
3. T. B. Lungs (early)	..	..	51 "
4. Chronic tubercular peritonitis	..	..	58 "
5. Tubercular glands neck	..	..	31 "
6. Syecosis	..	..	37 "
7. Others	..	..	181 "

The results were satisfactory in most though a few showed improvement up to a certain stage only.

1. A patient of M4, a lady aged 31 with low fever, early signs in lungs, noticed clinically and in the radiograph, had exposure to ultra-violet rays for two months. Her weight at the start was 95 lb. During the first few treatments her fever stopped and at the end of the course she was apparently well and her weight went up to 110½ lb. In addition to the above she had open air treatment and calcium internally.

2. A Mahommadan gentleman, aged 37, with slight fever, cough, etc., had treatment for nearly 3 months at the end of which time he had no fever, almost free from cough and his weight went up from 107 lb. to 126. He had no other treatment excepting 6 injections of colossal calcium.

The Solux Lamp with blue and red filters, was used with good results in a large number of cases of inflammatory lesions, painful joints, eczema with severe itching.

The blue light, especially, was very useful in allaying the pain in the joints, in cases of neuralgia and sciatica and also relieved the itching in several cases of skin diseases and gave sleep to many such patients.

The Radiant Heat apparatus is fitted with special red, carbon bulbs to assist in the absorption of pathological fluids and to increase the heating and curative effect of the red rays of the spectrum through a red liquid medium, viz., the red blood corpuscles. This was used in many cases of ascleitis due to nephritis, cirrhosis of liver, cardiac disease and tubercular peritonum.

Superficial X-ray Therapy.—During the year under

report 3,923 treatments were administered, the aggregate dosage being 3,272 Sabouraud "B" doses.

Deep X-ray Therapy.—1,052 exposures were administered, this figure giving an average of 9.31 treatments for each patient, the average dose being 20.97 Sabouraud "B".

Diseases.—The principal diseases for which X-Ray treatment was given were:—

1. Skin affections including eczema, ring-worm, syecosis, etc.
2. Enlargement of lymphatic glands, chiefly due to tubercle.
3. Infective granuloma.
4. Tumours, malignant and non-malignant.
5. Diseases of uterus both functional and organic.
6. Goitre.
7. Tuberculosis of lungs.
8. Tuberculosis of abdominal organs.
9. Constitutional diseases, such as rickets.
10. Diseases of blood, such as leukaemia, pernicious anemia, etc.

Below is given the reports received from Medical Officers with regard to some of their patients:—

1. **Skin.**—(1) **Eczema.**—A patch of 1½ inches diameter on the inner side of right ankle. After four exposures of ½ "B", and 7 exposures of "B" doses, the patch completely disappeared.

(2) **Eczema.**—Patches of eczema on the dorsum of both feet and lateral aspect of both ankles, in duration 6 months, very thick and black. After the first course of exposures the thickness of the patches was reduced and the black colour changed to a lighter tone. A second course was given when the thickness completely disappeared and the skin regained almost the natural colour.

(3) **Chronic Eczema**, duration 3 years, dry black patch on the inner aspect of left leg. Thin scaly eczema on the back of neck. The first course of treatment did not give much improvement. At the end of a second course after three weeks' rest, all the thickness disappeared and the colour of skin was almost normal.

Skin.—(1) **Barbers' itch.**—A course of 6 fractional exposures was given and the condition was cured.

(2) **Sycosis-neck.**—A course of 7 fractional exposures was given, with complete disappearance of the disease.

Skin.—(1) **Lupus Erythematosus**, duration 8 months, on either side of the nose, patch about the size of a rice. At the end of a five weeks' course of treatment, the left side of the nose completely cleared, right side much improved.

(2) **Patches of ulcer** on the right side of face, upper lip and over both eyelids, duration 1 year. A course of 4 weeks' exposures was given and the ulcers, except the one in the lip, are almost healed.

2. **Enlargement of Lymphatic glands.**—There were enlarged glands on both sides of neck. Duration 1 year. Two courses of exposures were given with an interval of a month between. At the end of the second course, the glands on the left side completely disappeared, and those on the right were very much improved.

3. **Hodgkin's disease.**—Duration 4 years. Glands in the axilla, neck, and supraclavicular region were enlarged. Patient had one course of treatment in 1924. A second course of treatment in 1925. There was a slight improvement. A third course was given in 1927. At the end of this the glands completely disappeared. At the commencement of the treatment glands were about the size of a big lime.

4. **Functional disease of the uterus.**—(1) **Menorrhagia.** Patient aged 45 with a history of profuse bleeding at irregular intervals. A course of "deep therapy" exposures was given. After a rest two more courses were given with the usual interval of 3 weeks. At the end of the sittings the patient was completely relieved.

(2) Patient, aged 24, unmarried, had severe bleeding at each period. A course of six exposures was given and at the end of the treatment the hæmorrhage completely stopped.

5. *Organic disease of uterus—Fibroid.*—Patient aged 30 was suffering (1) from anæmia, loss of sleep and debility. P.V. uterus as large as a mango, soft, painless, slight bleeding on examination. Vagina and cervix all right; soft fibroid tumour of the uterus. A course of "deep" X-Ray exposures was given. After the sixth exposure, the hæmorrhage completely stopped. After the twelfth tumour was found to be smaller on abdominal palpation. Six weeks' rest was given. In the meanwhile patient was examined by a lady doctor whose findings are:—"No appreciable diminution of the tumour but it is much softer. Patient's general condition much improved."

A second course of exposures was given and at the end an examination showed the tumour to be much smaller.

A number of other cases showed improvement, such as cessation of hæmorrhage, improvement in general health, etc.

A number of cases of cancer of cervix showed improvement in the way of diminution of offensive discharge, and improvement of general condition.

6. *Leukæmia.*—Patient, European, aged 50, female, was admitted to the hospital on 22nd August 1927 for splenomedullary leukæmia. Condition of the blood on admission was as follows:—

R.B.C.	..	..	3,000,000
W.B.C.	..	..	91,500
Hæmoglobin	..	..	56 per cent.
Colour index	..	..	0.9

Treatment commenced on 24th August 1927. After the first treatment, the result of blood examination was as follows:—

R.B.C.	..	..	3,500,000
W.B.C.	..	..	25,625
Hæmoglobin	..	..	60 per cent.
Colour index	..	..	0.85

At the end of the course the blood was almost normal except for the presence of mast cells and a few myelocytes. There was enlargement of spleen at the commencement of the treatment which completely disappeared by the end of the course.

Disease of Thyroid—(a) (Functional).—Patient, Hindu, male, age 28, admitted into the hospital with tremors of the hand with a pulse rate of 14 a minute, the result of post-encephalitis. A course of exposures was given and after the fourth treatment the pulse rate came down to about 78, the tremors improving. At the end of the course the patient was normal.

(b) *(Organic).*—(1) Patient, Anglo-Indian, aged 38, was admitted to hospital with enlargement of the thyroid and a pulse rate of 112 per minute. A course of exposures was given. Size of the tumour was much reduced and hardly noticeable, except by palpation. Pulse rate 92 per minute. After an interval of 6 weeks, patient returned to the institute with a pulse rate of 100 per minute. Size of the swelling not increased.

At the end of a second course of exposures, the pulse rate fell to 84 per minute, the size of the thyroid remaining the same.

(2) Patient, Hindu, female, aged 45, was admitted to hospital with a swelling on the right side of neck corresponding to right lobe of thyroid. Pulse rate on admission 96 per minute.

At the end of a course of X-Ray treatment the size was much reduced and the pulse rate fell to 84.

Radium.—The Superintendent of the Tuberculosis Hospital and Institute has a small plaque containing a few milligrammes of radium element and this has been in use for several years by that Medical Officer.

The X-Ray Institute received its first supply of radium early in the year. It consisted of 115 milligrammes of radium sulphate (Ra SO_4) equal to 214.5 milligrammes of radium bromide ($\text{Ra Br}_2 \cdot 2\text{H}_2\text{O}$). This was distributed in 32 platinum-iridium needles or tubes and one Monel metal plaque.

A patient of Lt.-Col. R. E. Wright, I.M.S., suffering from angioma of the left upper eyelid, was the first to be treated. This was on 2nd March and on 17th March Major K. G. Pandalai, I.M.S., did the first

implantation of radium needles, in a case of growth of the tonsils.

During the year 329 exposures were given, these including four cases of cancer of the buccal region in which Lieut.-Col. E. W. C. Bradfield, I.M.S., implanted needles, the exposures being about 1,440 milligramme hours (Ra SO_4). The remainder of the patients were sent by medical officers in Madras to the X-Ray Institute for external applications of radium, when a varied number of milligrammes of radium were applied for three hours or more at a sitting, some of the patients receiving more than one exposure.

It is too early for any definite opinion to be formed as to the permanent value of the treatment, but we understand that the medical officers concerned are well satisfied with the results up to now.

With the price of radium at about £12,000 per gramme it was only possible to begin the "Madras Radium Service" with a small quantity and the demand has exceeded the supply, however, with co-operation between the medical officers concerned, who use the radium by turn when requiring big doses, there has been no hitch.

During 1927 a further supply of 115 milligrammes Ra SO_4 was ordered from Belgium and this should be received in Madras at the end of March 1928.

Radium Emanation.—The life of radium is about 2,500 years and during its disintegration gives an emanation called Radon, a gas which during its active period—lasting a week or so—has the same radio active intensity as the mother element. Although the radium remains practically the same weight, this gas is being constantly formed. It is prepared from a solution of radium bromide by means of an intricate apparatus. Radon is extensively used in Europe and America, the emanation being despatched by post to medical practitioners and hospitals having no radium. The Radium Institute in London and the Middlesex Hospital in London each have an apparatus, which is a source of income to those institutions. The Radiologist proposes to obtain the Surgeon-General's approval and Government sanction to install such an apparatus in the X-Ray Institute, Madras, so that he may provide the District Medical and Sanitary Officer up-country, and medical practitioners, with Radon with which they can carry out radium treatment.

Correspondence.

SULFARSENOL IN THE TREATMENT OF SYPHILIS.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—The following case presents a point of interest such as to warrant its publication:

Mr. Y. R., aged 30 years, came to this dispensary for treatment of syphilis (secondary stage). He was in a weak state. I gave an intramuscular injection of 18 cgm. of Sulfarsenol immediately. He was rather nervous and felt giddy. This, however, soon passed away. Half an hour later, profuse bleeding commenced from the gums, particularly from the portion adjoining the upper incisors.

I immediately applied tinct. benzoin co. on cotton-wool as a plug. This had no effect. I applied tinct. ferri perchloride, tannic acid, and adrenalin swabs in succession but in vain. Then as a last resort, I gave 5 min. of adrenalin chloride sol. (1 in 1000). Even this had no effect. The patient was getting exhausted. I had no other drugs on hand and to get such drugs as calcium chloride or lactate was impossible, as this place is in the interior of the Kurnool district devoid of any communication.

By this time, 4 hours had elapsed since the commencement of the bleeding. In the meanwhile the medical officer in charge of the cholera party came here. I consulted him and he kindly gave me 2 ampoules (2 c.c.) of calcium chloride. I immediately gave an

intramuscular injection. After half an hour the bleeding stopped completely.

In this particular case the patient gave a history of bleeding from the gums of a mild nature a month back.

In the literature supplied with the tube of Sulfarsenol, it is stated under the heading "Blood Transfusion" that 6 cgm. of Sulfarsenol dissolved in 12 c.c. of water renders 100 grms. of blood incoagulable.

Now I wish to know if the anti-coagulating property of Sulfarsenol was responsible for the bleeding which resisted treatment for some hours till calcium chloride came to the rescue.—Yours, etc.,

B. SUKHAVANAM, L.M.P.,
Sub-Assistant Surgeon.

GADIVEMULA,

22nd September, 1928.

RAT-BITE FEVER.

To the Editor, THE INDIAN MEDICAL GAZETTE.

SIR,—On perusing the most illuminating article on "Rat-bite fever as an Indian disease" by Lieutenant-Colonel R. Knowles, I.M.S., and Assistant Surgeon B. M. Das Gupta in the current number of the *Indian Medical Gazette*, I am tempted to request you kindly to allow me a little space in the *Gazette* for the publication of the following few observations of mine regarding "Rat-bite fever" in the Madras Presidency.

Rat-bite fever is fairly common in the Madras Presidency also. The fever is of the usual type so excellently described in the article with the aid of temperature charts. It is a common belief in some parts, at least, of the Madras Presidency that the bite of a rat, which is thoroughly upset and in the full frenzy after or during a fierce quarrel with a fellow rat, is the one that is really infectious and produces symptoms of rat-bite fever, and not the bites on other occasions. Probably the acute *Spirillum minus* infection produces in the rat, a state of violent delirium which may account for its quarrel with a fellow and his unprovoked bite on the human-being. The infectious rat-bite has almost always occurred in the night.

Asthma is believed to be a very common sequel to "rat-bite fever" and I have seen and heard of cases of asthma dating their origin from a rat-bite. The village folk are used to undergoing elaborate native treatment for any kind of rat-bite lest they should suffer from the terrible "rat-bite asthma" as they call it.

Like untreated "relapsing fever" that cures itself in some cases after a few relapses, rat-bite fever also cures itself in some after a few bouts and in rare instances even after asthma has set in.

I remember a case which occurred some years ago in my own village in this Presidency. The person, a female, aged about 30 years was bitten by a rat on the dorsum of her left hand. About ten days after she developed high fever with brawny induration of the bitten part and with swelling and acute lymphangitis of the whole extremity. No septic complications, such as abscess formation, ulcerations, etc., occurred at the site of the bite. After the usual course the fever passed away only to recur regularly once a fortnight or a month peculiarly coincident with the new moon or full moon. She gradually became much debilitated and in the course of a year developed acute asthma. She dragged on a miserable existence and finally pulmonary tubercle ended the scene after about 5 years or so.

Many cases of rat-bite fever do not come to light as the public are still ignorant of the discovery of the specific cure for rat-bite fever, viz., salvarsan and its allies.

Thanking you in anticipation.—Yours, etc.,

T. S. DAKSHINAMURTHI,
Sub-Assistant Surgeon, Alipuram Jail.

BELLARY CANTONMENT,
25th September, 1928.

Service Notes.

APPOINTMENTS AND TRANSFERS.

Colonel J. W. D. McGaw, C.I.E., M.B., V.H.S., I.M.S., Inspector-General of Civil Hospitals, Punjab, is appointed to officiate as Surgeon-General with the Government of Madras, with effect from the forenoon of 26th September 1928.

Lieutenant-Colonel H. M. Mackenzie, M.B., I.M.S., Professor of Pathology, King Edward Medical College, Lahore and Bacteriologist to the Government of the Punjab, is appointed to officiate as Inspector-General of Civil Hospitals, Punjab, with effect from the forenoon of the 19th September 1928.

Lieutenant-Colonel S. J. Bhathena, I.R.C.P. & S. (Edin.), L.F.P.S. (Glas.), I.M.S., is appointed Civil Surgeon, Surat.

Lieutenant-Colonel A. Cameron, O.B.E., I.M.S., Civil Surgeon, on return from leave, to Aligarh.

Lieutenant-Colonel E. C. Hepper, I.M.S., Civil Surgeon, on return from leave, to Bareilly.

Lieutenant-Colonel H. Ross, C.I.E., O.B.E., I.M.S., Civil Surgeon, on return from leave to Cawnpore.

Major C. J. Stocker, M.C., M.D., I.M.S., Civil Surgeon, Hoshangabad, is appointed to be Civil Surgeon, Pachmarhi, from the 15th September 1928 to the 31st October 1928.

Major G. T. Burke, I.M.S., Civil Surgeon, from Cawnpore to Saharanpur.

Captain S. D. S. Greval, I.M.S., and Lieutenant-Colonel T. C. McCombie Young, I.M.S., are appointed substantively to the Medical Research Department, with effect from the 16th August 1928.

The following officers of the Indian Medical Service are appointed substantively to be Agency Surgeons under the Government of India in the Foreign and Political Department, with effect from the dates shown against their names:—

Major R. Hay. Dated 3rd July 1928.

Captain R. S. Aspinall. Dated 7th August 1928.

Captain L. K. Ledger. Dated 4th July 1928.

LEAVE.

Lieutenant-Colonel A. G. Tresidder, C.I.E., M.D., I.M.S., is granted leave for four months and fourteen days, with effect from the 8th December 1928.

Lieutenant-Colonel J. F. Boyd, I.M.S., Civil Surgeon, leave for three months in extension of the leave already sanctioned.

Lieutenant-Colonel W. A. Mearns, I.M.S., Assistant Director of Public Health, United Provinces, leave for two months and thirteen days in extension of the three months' combined leave already sanctioned.

Leave for two months is granted to Lieutenant-Colonel P. M. Rennie, I.M.S., in extension of the leave already granted to him.

Major A. C. Craighead, I.M.S., an officer of the Medical Research Department on foreign service under the Indian Research Fund Association, is granted combined leave for one year, i.e., eight months on average pay and four months on half average pay, with effect from the 1st January 1929, or the date on which he avails himself of it. His services are replaced at the disposal of the Director-General, Indian Medical Service, with effect from the date on which he proceeds on leave.

Major W. C. Spackman, I.M.S., is granted leave on average pay for eight months combined with leave on half average pay for one month and study leave for three months, with effect from the 3rd November 1928 or date of relief.

Leave for eight months is granted to Major G. H. Mahony, I.M.S., with effect from the 21st May 1928.

RETIREMENTS.

Lieutenant-Colonel S. H. Middleton-West, M.C., M.B., I.M.S., with effect from the 15th August 1928.

Lieutenant-Colonel H. Watts, M.B., on account of ill-health from 10th May 1928.

PROMOTION.

Major A. A. McNeill, I.M.S., to be Temporary Lieutenant-Colonel, 28th January to 22nd October 1927.

whilst Commanding No. 33 Field Ambulance, Shanghai Defence Force.

Captain (Temporary Major) A. N. Sharma, I.M.S., to be Temporary Lieutenant-Colonel, 5th August 1927 to 7th February 1928, whilst Commanding No. 1 Indian General Hospital, Shanghai Defence Force.

Captains to be Majors.

Jagat Ram Kochhar, M.B. Dated 16th September 1928.

J. G. Bird. Dated 23rd July 1928.

J. E. Dhunjibhoy. Dated 20th August 1928.

Lieutenants to be Captains.

A. Rosenbloom. Dated 3rd March 1928.

M. P. Conroy. Dated 3rd March 1928.

W. J. Shipsey. Dated 31st March 1928.

C. L. Pasricha. Dated 20th May 1928.

NOTES.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

(DIVISION OF TROPICAL MEDICINE AND HYGIENE.)
Examination Result. 84th Term. March—July, 1928.

Passed with Distinction.

C. N. Griffin— G. L. Chadha.
Winner of "Duncan" C. D. Newman.
medal.
M. C. Cairney. A. N. Sharma.

Passed.

T. D. Ahmad.	H. Kaits.
M. Broadbent.	M. Keith-Thompson.
W. W. Cadbury.	J. N. Leitch.
B. Chase.	A. C. Lovett-Campbell.
S. S. Crosse.	K. R. Lundeborg.
G. R. Cousar.	R. Macdonald.
L. D. Dennard.	L. J. McGregor.
C. H. Devereux.	E. G. Morris.
J. P. M. Donnelly.	A. B. Price.
N. M. Dotivala.	A. C. Reed.
A. Downing.	E. L. Robert.
A. W. Duncan.	J. Rodger.
G. C. Edwards.	M. Srisvasti.
W. H. Emslie.	H. C. Tait.
H. A. Gilkes.	J. D. S. Thomas.
I. S. Gupta.	W. S. Thomas.
D. C. G. Hanlon.	A. G. Thomson.
A. Halawani.	R. F. Tredre.
I. S. Hilmy.	M. K. Tucker.
M. Jafar.	K. H. Uttley.
H. C. Johnson.	K. Vernon.
H. F. Johnson.	R. N. Walker.

E. R. Wide.

DIMOL AS AN INTESTINAL ANTISEPTIC.

THERE has been considerable discussion in medical journals during recent years as to the value of "Dimol"—an intestinal antiseptic to which we have previously drawn attention. That the drug "suits" some "intestinal" patients cannot be denied; we know indeed of one patient who is in a "pre-sprue" condition who is never comfortable unless he is taking a steady course of it from time to time. The value of intestinal antiseptics—so-called—of any class is very much open to question, but Dimol is at least a remedy which has been "under consideration" of the medical profession for some years.

In *The Medical Officer* for the 3rd March, 1928, there appears an article by J. O. Oliver, M.B., B.S. (Lond.), M.R.C.S., L.R.C.P., on "Intestinal disinfection in the treatment of rheumatic arthritis," which describes the treatment of 10 cases by "pulverettes" of Dimol, from which we take the following abstract.

"*Nature of the tests.*—The cases treated in this series were in no way selected for treatment. The test consisted of an estimation of the numbers of each of the more important aerobic micro-organisms present in the faeces before treatment was commenced, and again at the

conclusion of a course of treatment consisting of the daily exhibition of pulverettes of Dimol by the month over a period of two months, a comparatively short time considering the chronicity of the disease.

A routine method of dealing with the specimens bacteriologically was adopted in order that the results obtained might be comparable with one another.

A case history was asked for and supplied by the usual medical attendant of each of the cases and a further report supplied at the conclusion of the treatment.

Report of cases.—Ten cases of rheumatoid arthritis were treated and tested in the manner described.

Six cases, or 60 per cent., showed definite improvement under treatment.

Four cases, or 40 per cent., did not show definite improvement as a result of the treatment.

As the cases were unselected from the point of view of their especial suitability for treatment with Dimol, it is instructive to inquire more particularly concerning those cases regarded as failures or partial failures of treatment. In doing this I find that whereas the average duration of the illness in those cases showing improvement was 1½ years (with periods ranging from 1 to 3 years), in those cases which did not show this improvement the average duration of the illness was four years (with periods ranging from 2 to 8 years). Such a fact clearly indicates the advantages of early treatment, and at the same time shows that in this series the early case had an excellent chance, amounting to some 80 per cent, of deriving benefit from the course of treatment with Dimol.

Such findings as these are distinctly encouraging, and the fact that the cases were unselected and, therefore, may include some having a focus of toxin production other than an intestinal one (which alone could be benefited by such a drug as Dimol), as well as the known unsuitable conditions under which at least two of the cases were living, must add to the credit given to the treatment.

A study of the bacteriological findings, both before and after the treatment, shows that as far as streptococci are concerned there was an average reduction of 42 per cent. in the specimen taken after treatment as compared with that examined before treatment was commenced. The actual reductions recorded in the present series of cases were: 23, 38, 97, 70, 53, 51, 20 and 13 per cent.

This work is being very considerably extended, and for that reason the full records of each individual case have not been given; at a later date it is hoped to publish these with a further and larger series of cases."

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